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MYCOLOGICAL SERIES, No. 1

THE GENERA OF GASTROMYCETES

Illustrated with 49 Figures

By C. G. LLOYD

INTRODUCTION.

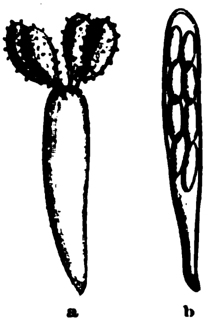

Fig. 1.
a—A basidium, bearing spores.
b—An ascus, containing spores.

Fungi, the larger fungi, are divided into two classes, 1st, the Basidiomycetes, which have the spores borne free on a basidia; 2nd, the Ascomycetes, which have the spores borne in a sack called an ascus. In this pamphlet we have to deal only with part of the first class.

The Basidiomycetes can in turn be divided into two very natural classes, 1st, the Hymenomycetes, those that have the spores exposed and free from the beginning, or at least from a very early state; 2nd, the Gastromycetes, those that develop the spores in cavities or chambers *within the tissue of the plant*. We are aware that these divisions are not in keeping with the very latest authorities which primarily divide the Basidiomycetes into sections based respectively on septate or nonseptate basidia, but we believe that these latter divisions while possibly theoretically correct, tend only to confuse matters excepting to the advanced and expert student.

It should not be inferred from the above that in order to recognize the Gastromycetes it is necessary to study the nature of the basidia, or make other minute anatomical examination. As a matter of fact, the merest tyro soon learns to recognize on sight the various phalloids, bird-nest fungi, and various kinds of "puff-balls" constituting the Gastromycetes and they were well classified before their anatomical structures were known.

Terms used in the description of the Gastromycetes.

PERIDIUM.

The shell or hull, enclosing the spore mass of a gastromyces is called the peridium. It varies in the different genera, the simplest type is a simple, uniform layer such as surrounds the spore mass in the accompanying cut of Scleroderma. (Fig. 2.) Usually however, the peridium consists of two distinct layers, called the outer peridium or exoperidium and the inner peridium or endoperidium. In Geaster, the outer peridium is thick and when the plant (*) ripens it splits in a stellate manner separating from the inner peridium and becoming more or less reflexed.

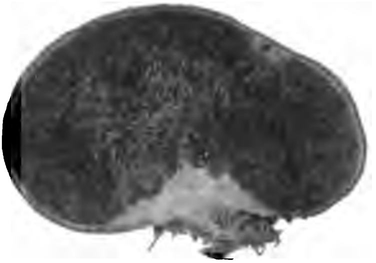

Fig. 2
Section of a Scleroderma.

(*) In speaking of the "plants" it will be observed that we do not use precise language for what we call the "plants" are really the fruit bodies. compound sporophores, of the fungi, corresponding to the fruit of flowering plants, but it seems more natural in a work intended largely for general distribution to call a "puff-ball" or a "toad-stool" a plant than a fruit body. The vegetative portions of fungi, corresponding to the stem of flowering "plants" are thread-like growths called the mycelium, that permeate the soil or rotten wood, and which in reality bear the fruit bodies. or sporophores, that we have chosen here to call plants.

(See Plate 8, figures.) In Lycoperdon, Bovista, and many genera, the outer peridium is a thin, friable coat, often bearing spines or warts. As the plant matures this membrane usually peels off and disappears. (See Fig. 3.) When the outer peridium is of this nature it is called the cortex. In the genus Mitremyces the outer peridium is a thin membrane covered with a thick gelatinous mass. (See Plate 5, Fig. 29.) As the plant ripens this thin membrane breaks into little pieces which curl up and fall off carrying the thick gelatinous coat with them. All phalloids are in the young state enclosed in a thick, gelatinous membrane corresponding to a peridium, and called the volva. The outer peridium of Mitremyces is also usually called the volva. The phalloid is only enclosed in its volva during its young or "egg" state. (See Plate 1, Fig. 16.) When the plant grows the volva is ruptured at the apex, and remains as a cup at the base of the plant. (See Plate 1, Fig. 15.)

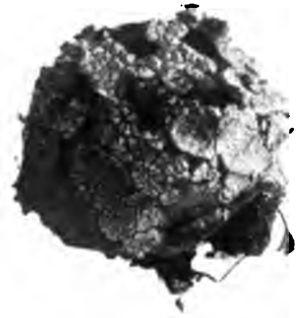

Fig. 3.

A Lycoperdon with the cortex peeling off.

THE STEM OR STALK.

Many genera of Gastromycetes, (Lycoperdon, Bovista, etc.,) are entirely destitute of any stalk or stem, but other genera (Tylostoma, Queletia, etc.,) are characterized by having the peridium borne on a distinct stalk. The base of the peridium of Lycoperdon, (see Plate 10, Fig. 45,) or Calvatia, is often contracted into stalk-like appearance, but must not be confused with the true stem of such genera as Tylostoma. Stalked gastromycetes are readily divided into two tribes: Tylostomeae in which the stalk is entirely distinct from the peridium and Podaxineae in which the stalk is continuous, forming an axis reaching the apex of the peridium.

THE GLEBA.

The inside of an immature puff-ball is filled with a white fleshy mass of soft cellular matter called the gleba.

Our study of the Gastromycetes has been confined to the mature specimens in our collection, but it will not be amiss to give the developments as recorded by De Bary, (whom we have for the most part copied in some sentences literally) Tulasne, Corda, Berkeley and others to whom we are indebted for our knowledge of the minute structure of the gleba. At first it is simply a cellular mass, but as the plant grows it gradually assumes the form of a tissue of minute chambers. The chambers of the gleba are in countless numbers, usually too small to be seen by the naked eye, and are narrow, irregularly curved, branched cavities, separated from one another by their curved plates of tissue which anastomose with one another in every direction. In the accompanying cut (Fig. 4) the chambers of the gleba can be seen with the eye (if the printer does justice to the cut); the chambers of the sterile base are very large and evident. The walls of the chambers consist of layers of branched hyphæ bearing a hymenial layer on both surfaces which line the interior walls of the cavities. The hymenial hyphæ terminate in basidia bearing usually four spores. The figure which we give herewith (Fig. 5) taken from Engler & Prantl, (originally from Tulasne) of an enlarged gleba chamber illustrates this structure. In this figure the hyphæ constitute the thread-like tissue forming the walls of the chamber, the basidia are seen to bear four sessile spores.

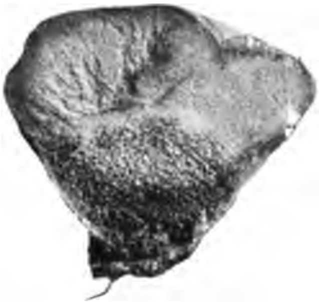

Fig. 4.
Section of a young Lycoperdon.

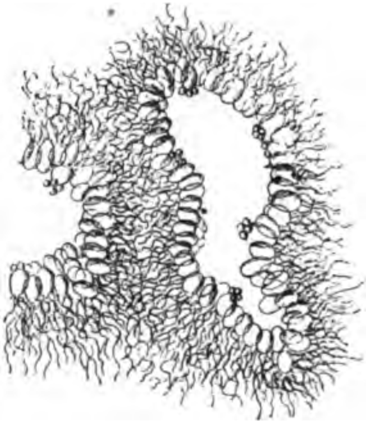

Fig. 5.
An ideal enlarged chamber of the gleba of Geaster.

In Scleroderma, Geaster hygrometricus, Polysaccum, and in certain other genera, all the hyphæ which enter a chamber are elongating, copiously branched, and woven together into a loose mass filling the chamber. (Fig. 6.) Plants possessed of this structure form the order Plectobasidineae of Fischer, but we think even if theoretically correct, it is not a matter of policy to classify plants by minute

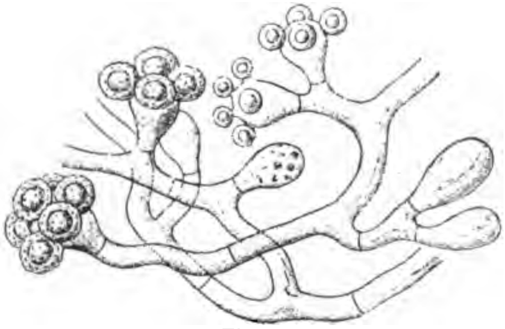

Fig. 6.
Basidia (enlarged) of Scleroderma.

anatomical differences which only an expert microscopist can trace and concerning which the ordinary student knows nothing excepting that which he reads.

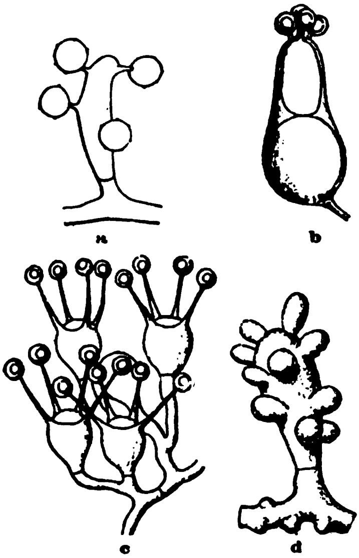

Fig. 7. Basidia.
a—Tylostoma. c—Bovista.
b—Geaster. d—Mitremyces.

BASIDIA.

If we believed in the German scheme of classification we would consider the basidia the most important part about a gastromyces and all other characters subservient to them. We are told that the basidia are of various shapes and that in some plants they form a lining to the gleba chambers. The way the spores are borne on the basidia is also characteristic; in Geaster they are almost sessile; in Bovista the spores are borne on long stalks called sterigmata; in Tylostoma and Mitremyces they are almost sessile and lateral. The number of spores also vary from four in Lycoperdon to a dozen or more in Mitremyces as shown in our cuts. These cuts copied from Engler & Prantl were originally from several authors. (*)

THE RIPENING OF PUFF-BALLS.

One of the most curious phenomena in connection with these plants is the change that takes place when the spores ripen. As the young plant grows the interior is a solid, white, firm, fleshy mass. When it reaches full size and ripens the tissues deliquesce, become moist, discolored, the tissues of the tramal chambers are absorbed and disappear, and finally the water dries away, leaving the peridium filled with a dry, dusty mass, usually consisting of slender threads and countless multitudes of ripe spores. This is now called the spore mass and the threads capillitium. The phenomenon of ripening in all Gastromycetes I believe is attended with deliquescense and absorption of more or less of the hyphal elements of the gleba, but the walls of the chambers do not in all genera disappear.

(*)We have given thus the detail of the minute structure of Gastromycetes as it is the basis of modern classification. Personally we do not approve of it. Assuming that it is the correct theory the time is not ripe for it. The basidial structure of comparatively few species is known. With by far the greater part of them and many genera the basidial structure is only conjectural. It seems to be the tendency of some writers to select the most obscure and difficult points on which to base classification. This has one advantage, it gives an air of greater learning. For our part we feel that a system based on points of difference of the mature plant obvious to the student, is more satisfactory and rational. To our mind there is no room in any *Natural* system of classification for the Nidulariaceae between Astræus (admitting the genus for argument) and Geaster, no matter what their basidial structure may be.

PERIDIOLES.

In the Nidulariaceæ or "bird-nest fungi" the walls thicken and each chamber remains as a separate, little seed-like body enclosing the spores. This is called a peridiole. (See Fig. 8.) In Arachnion the "puff-ball" is filled with sack-like peridioles appearing to the eye as grains of sand. In Polysaccum (see Fig. 9) the peridioles are large and only partially separated from each other, the interior of a broken plant having the appearance of being honeycombed. In Scleroderma the walls of the gleba chambers are more or less permanent in the different species. In some specimens of S. bovista they remain almost perfect and approximate Polysaccum. In most species of Scleroderma however, only fragments of the walls are mixed with the spores.

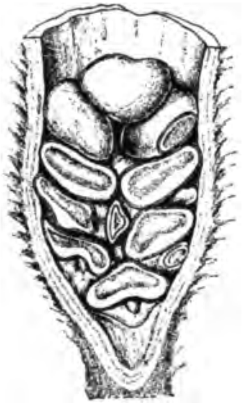

Fig. 8.
Section (enlarged) of a Cyathus,
showing peridioles.

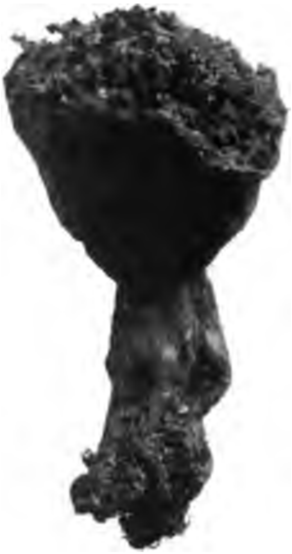

Fig. 9.
Polysaccum with upper portion broken off,
showing peridioles.

CAPILLITIUM.

The threads that are contained in the spore mass of various Gastromycetes, though absent in many genera, are characteristic in each genus that has them, and are important factors in classification. How much longer I do not know, but certainly as far back as 1876, the peculiarities of the capillitium of the different genera were described and illustrated by Hesse.

There are two distinct types of capillitium threads. 1st, the threads are long hair-like strands, simple or more or less branched and interwoven, (see Fig. 11) proceeding from the inner walls of the peridium or the columella of the plant. 2nd, the threads are relatively short and branched, each entirely separate and distinct from the other (see Fig. 10), though the branches are usually interwoven, and have no connection with the peridium or columella. The latter type is characteristic of Bovista, Bovistella and Mycenastrum. Threads of the first type are usually broken into short fragments in the ripe spore mass, but are readily distinguished from those of the second type by the blunt ends of the fracture. Threads of the 2nd type when perfect run out in all directions into sharp pointed branches. (*)

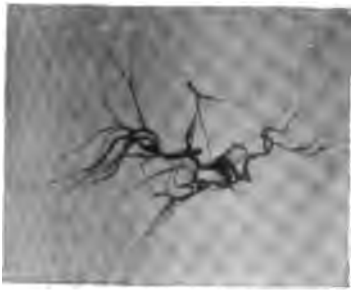

Fig. 10.
A Capillitium thread (magnified) of Bovista.

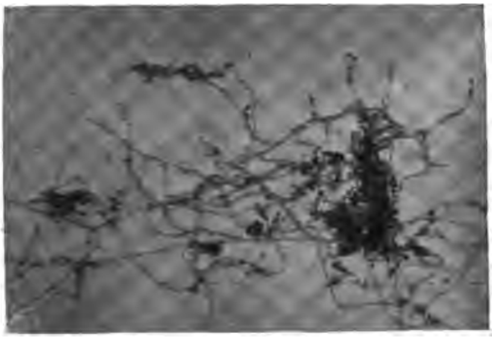

Fig 11.
Capillitium of Tylostoma. (magnified.)

Capillitium threads have varying character in different genera. In Calvatia they are long, branched, and interwoven. In Catastoma, mostly broken in short fragments. In Tylostoma often septate. In Mycenastum they bear little spiny processes. Usually they are colored, sometimes hyaline.

The hyphal strands that persist as capillitium are shown by Tulasne as penetrating and passing through the walls and chambers of the gleba. We can readily understand this structure in such genera as Lycoperdon where they are attached to the peridium or columella, but the exact attachment is obscure to our mind where they are "separate threads"

(*) Capillitium threads are relatively large microscopic objects, often visible to the naked eye and readily examined under low (1 inch lens) magnifying power. By simply pressing a fragment of spore mass on a slide the nature of the threads can usually be readily made out. To secure separate threads of Bovista type put a little spore mass in a small vial half filled with alcohol. Agitate violently and pour the alcohol over a clean slide, and separate threads can be readily floated out.

SPORES.

The ripe spores of Gastromycetes are readily examined under a microscope (¼ inch power is the best) and afford characters useful in distinguishing species. Some spores are smooth, some spinulose; more are globose but some are oblong or oval. They vary also in size and in color. Some spores are borne on the basidia on long sterigmata (see fig. 7c) which as the spores ripen persist attached to the spore and are known then as pedicels. (See Fig. 14.) The value of pedicellate spores as a specific character is a disputed question. I am convinced that in some species the persistence of the pedicel depends on the stage of development when the plant is collected as I have found pedicellate and non-pedicellate spores in different plants of same species and of same collection. Massee says the pedicels of spores of old herbarium specimens are always broken off, hence the character of no value. We know however, that there are certain species such as Bovistella Ohiense, Bovista plumbea, in which the pedicellate spores are constant and persist for years, and we feel that in such cases the character is of value, even if it does disappear with age.

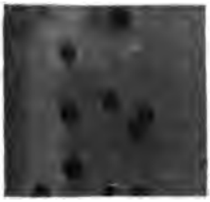

Fig. 12.
Globose spores of Mitremyces lutescens.

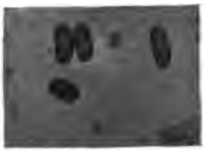

Fig. 13.
Oblong spores of Mitremyces cinnabarinus.

Fig. 14.
Pedicellate spores of Bovista

STERILE BASE.

In Lycoperdon, Calvatia and other genera, all portions of the gleba are not fertile and spore bearing. The lower portion called the "sterile base" consists simply of sterile cells or threads. The "sterile base" has been made a character to distinguish genera, Globaria of recent writers being simply Lycoperdon devoid of a sterile base. While it is a good primary character to divide the genus Lycoperdon, there are all shades of development from species with none at all, through species with very little, to species with it strongly developed, and I feel that it alone should not be held of generic importance. Several species shed their spores but the sterile bases persist through the winter and are often picked up for perfect plants. Bosc described and illustrated Calvatia cyathiformis on such a remnant, thinking it was a perfect plant.

HISTORICAL.

As previously stated, we do not believe in the recent German classification of Gastromycetes based on minute anatomical differences such as basidia. A natural system drawn from characters found in the mature plants has been evolved gradually, can be readily understood, and plants can be identified by anyone with little trouble. There is no department of mycology where there is so much confusion as in the Gastromycetes, and it is a most puzzling task to try and trace the species through the writings of the various authors. While it is necessary for us to study the history of the plants, we do not attach the importance to solving these old time puzzles that we do to the study of the plants themselves. Saccardo's Gastromycetes is probably the poorest compilation of all his volumes. Sclerodermas, Mycenastrums and Bovistellas; Bovistas, Catastomas and Globarias,* are all jumbled indiscriminately together and often the same species appears under two or three different names. Absence of illustrations, or crude attempts at it on the part of authors, are responsible for much of this trouble. Endeavors on the part of authors, such as Fries and Persoon, to classify species that they know nothing of, on these crude illustrations further contributed to the confusion. In our pamphlet we shall make no attempt to compile genera or species that we have not in our collection or have not seen and studied. Most of our specimens have been submitted to Bresadola and Patouillard, in our opinion the best authorities in the world.

In our country there have been three important workers with the Gastromycetes, Peck, Trelease and Morgan. Prof. Peck wrote an account of the New York species of Lycoperdon which appeared in the 32nd Report (1879). This is a very plain description of the species that he had seen and studied as they grew, and is one of the best accounts that has appeared. Those who live in the Eastern section of our country, can take this old monograph and make out most all the Lycoperdons that they find. Practically the same paper, to which was added a compilation of species described which he had not met, was published in the Transactions of the Albany Institute under the title of "United States Species of Lycoperdon." A paper on "The morels and puff-balls of Madison (Wisc.)," by Prof. Trelease, appeared (1889) in Transactions of Wisconsin Academy of Sciences. This article gives evidence of great study and research, and the conclusions Prof. Trelease reached are mostly maintained at the present day. Unfortunately, the paper is illustrated by most miserable figures.

Prof. Morgan has probably done more work on the Gastromycetes in this country than any other man, wrote four papers on the subject that were published in the Journal of the Cincinnati Society of Natural History (1889 to 1892). The field was not completely covered as the work was not completed. Morgan made a critical study of the internal structure, especially the capillitium of "puff-balls," and established several new genera that are universally recognized.

(*) Using the term for convenience for Lycoperdon without sterile base.

CLASSIFICATION.

Gastromycetes can be readily divided into four families widely differing from each other as to the nature of the mature plants.

FAM. 1.—PHALLOIDEAE.—PHALLOIDS. Plant fleshy, enclosed in a gelatinous volva when young. The gleba deliquescing and becoming a mucilaginous (generally foetid) mass.

Phalloids are noted for the foetid odor that they have and for their bazarre shapes. They force themselves to the attention of the most unobserving and are often called such appropriate names as Stink Fungus, Stink Horns, Dead Mens' Fingers. Our most common species are Phallus duplicatus, and Phallus Ravenelii. In the South, Clathrus columnatus.

FAM. 2.—NIDULARIACEAE.—NEST FUNGI. Plants shaped like little cups, opening at the top, and containing a number of little seed-like bodies (peridioles). They look something like little birds' nests and are often called "Birds-nest fungi." Crucibulum vulgare and Nidularia striatus are our most common species.

FAM. 3.—HYMENOGASTRACEAE.—HYPOGEAL FUNGI. Peridium indehiscent; gleba cavities permanent, not resolved into a mass of spores; capillitium absent.

This family is mostly subterranean like the true tubers or truffles. Harkness has recorded many species from the Pacific Coast, and we have seen three from the section east of the Mississippi. It is probably that many occur but have been overlooked on account of their subterranean habits.

FAM. 4.—LYCOPERDACEAE.—PUFF BALLS.—Ripe peridium enclosing a mass of dry spores, often mixed with capillitium. Sometimes the gleba walls persist forming peridioles, but in those cases the peridioles are filled with a mass of dry powdery spores.

The largest and most frequent tribe of Gastromycetes and embracing all the families known as "Puff-balls."

GENERA OF LYCOPERDACEAE.

For the time being we will pass over the genera embraced in the first three families and enumerate the genera with which we are familiar, of the "puff-ball" family. We would divide the plants into four tribes.

TRIBE 1.—TYLOSTOMEAE.—Plant stalked. Stalk distinct from the peridium. Capillitium present.

Peridium opening by an apical mouth,
    Volva indistinct, adherent, ... TYLOSTOMA.
    Volva cup-like, ... CHLAMYDOPUS.
Peridium circumscissal, ... BATTARREA.
Peridium opening irregularly,
    Volva none, ... QUELETIA.
    Volva thick, permanent, ... DICTYOCEPHALOS.

TRIBE 2.—PODAXINEAE.—Plant stalked. Stalk continuous to the apex of the peridium forming an axis.
Gleba with irregular persistent chambers,
Peridium, club-shaped, ... CAULOGLOSSUM.
Peridium, round or conical, ... SECOTIUM.
Gleba with sinuate, lamellate plates, ... GYROPHRAGMIUM.
Walls of the gleba chambers not persistent, ... PODAXON.

TRIBE 3.—SCLERODERMEAE.—Plant not stalked, or stalk short, confluent with the peridium. Capillitium none.*
Peridium of a single layer,
Walls of the gleba chambers persistent forming peridioles, ... POLYSACCUM.
Walls of the gleba chambers most disappearing or only partially persistent, ... SCLERODERMA.
Peridium, double,
Outer peridium, thin (a cortex) . . . . ARACHNION.
Outer peridium, thick, gelatinous, ... MITREMYCES.

TRIBE 4.—LYCOPERDEAE.—Plant not stalked. Spore mass, dry spores mixed with capillitium.

TRIBAL ALLIANCE 2.—GEASTRAE,—EARTH STARS.—Peridium double, outer peridium thick, persistent, splitting into segments and recurving.
Mouth, one, ... GEASTER.
Mouths, several, ... MYRIOSTOMA.

TRIBAL ALLIANCE 2.—BOVISTAE,—TUMBLERS.—Outer peridium thin (cortex mostly peeling off). Inner peridium firm or papery. Mature plant loosened from place of growth.
Capillitium of separate threads, with slender pointed branches, ... BOVISTA.
Capillitium of separate threads bearing spiny points, ... MYCENASTRUM.
Capillitium threads broken into short fragments with blunt ends, ... CATASTOMA.

TRIBAL ALLIANCE 3.—LYCOPERDAE.—TRUE PUFF BALLS.—Outer peridium thin (cortex, mostly disappearing.) Inner peridium usually flaccid. Plants normally remaining attached to place of growth.
Capillitium of separate threads with slender pointed branches, ... BOVISTELLA.
Capillitium long threads more or less broken in fragments,
Peridium, opening by definite mouth, LYCOPERDON.
Peridium, irregularly ruptured, no lining membrane . . . . CALVATIA.
Peridium, irregularly ruptured, furnished with a lining membrane, ... HYPOBLEMA.

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*Basing the Tribe thus for convenience on the absence of capillitium, it embraces widely diverging genera, but we prefer to do this at least for the present rather than to multiply the tribes. Mitremyces is the type of a good tribe, Arachnion perhaps of another.

ILLUSTRATIONS.

We present herewith eleven plates illustrating the various genera. We expect to publish from time to time, pamphlets describing and illustrating the species of each genera.

Acknowledgement of Sources of Illustrations.

Fig. 1, 5, 6, 7, 8, copied from Engler & Prantl, (originally from various sources.)

Fig. 20, copied from drawing by V. S. White.

Fig. 10, 11, 12, 13, 14, 42, Microphotographs by Dr. Edward Thompson.

Fig. 9, 36, 37, Specimens from Mrs. Delia Sams, New Smyrna, Florida.

Fig. 17, 18, 35, Specimens from Simon Davis, Boston, Mass.

Fig. 21, 40, Specimens from A P. Morgan, Preston, Ohio.

Fig. 22, Specimen in collection of L. M. Underwood.

Fig. 23, Specimen from Dr. Wm. Herbst, Trexlertown, Pa.

Fig. 24, 26, 32, 49, Specimens in Ellis' Collection, New York Botanical Garden.

Fig. 25, Specimen from C. V. Piper, Pullman, Washington.

Fig. 27, Specimen from L. A. Greata, Los Angeles, Cal.

Fig. 30, 46, Specimens from Fred. J. Braendle, Washington, D. C.

Fig. 31, Specimen from Prof. A. J. McClatchie, Phoenix, Arizona.

Fig. 38, Specimen from Caroline A. Burgin, Philadelphia, Pa.

Fig. 39, Photograph from Fred. J. Braendle, Washington, D. C.

Fig. 41, Specimen from E. Bartholomew, Rockport, Kan.

Fig. 43, Specimen from Mrs. Eugene Wright, Hubbard Lake, Mich.

Fig. 4, 48, Specimens from Geo. E. Morris, Waltham, Mass.

Fig. 2, 3, 15, 16, 19, 28, 29, 33, 34, 44, 45, 47, Specimens collected by author.

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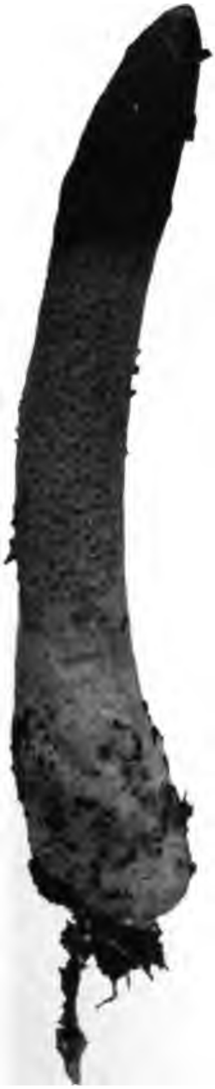

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Fig. 16.
Section of egg. Mutinus elegans.

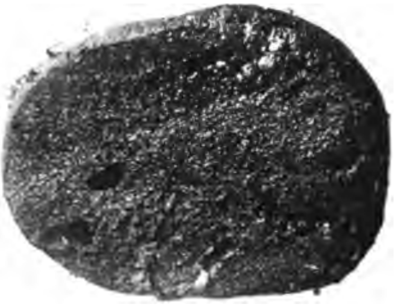


Fig. 17.
Section of Rhizopogon luteolus.

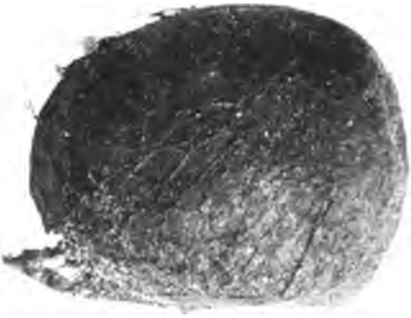
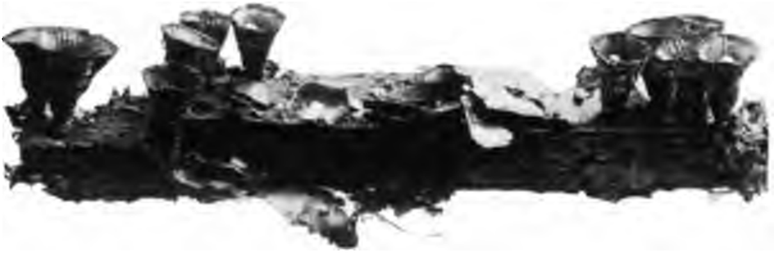


Fig. 18.
Rhizopogon luteolus

PLATE 2.



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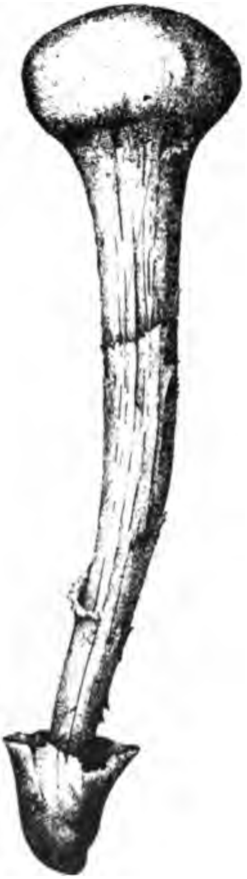

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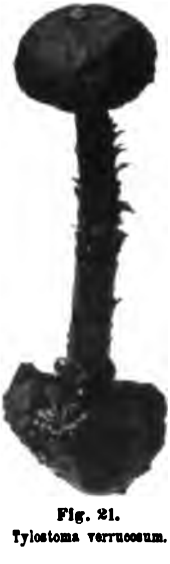

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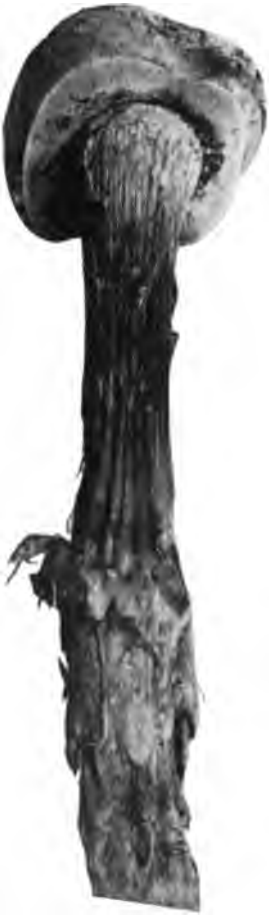

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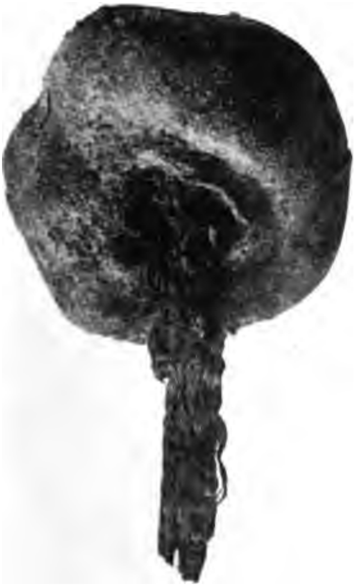

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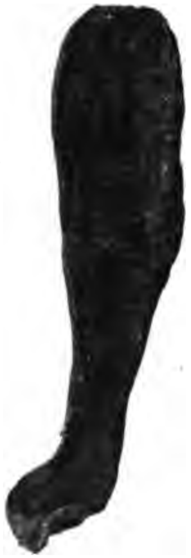

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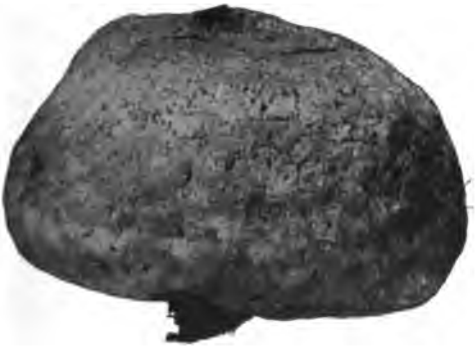

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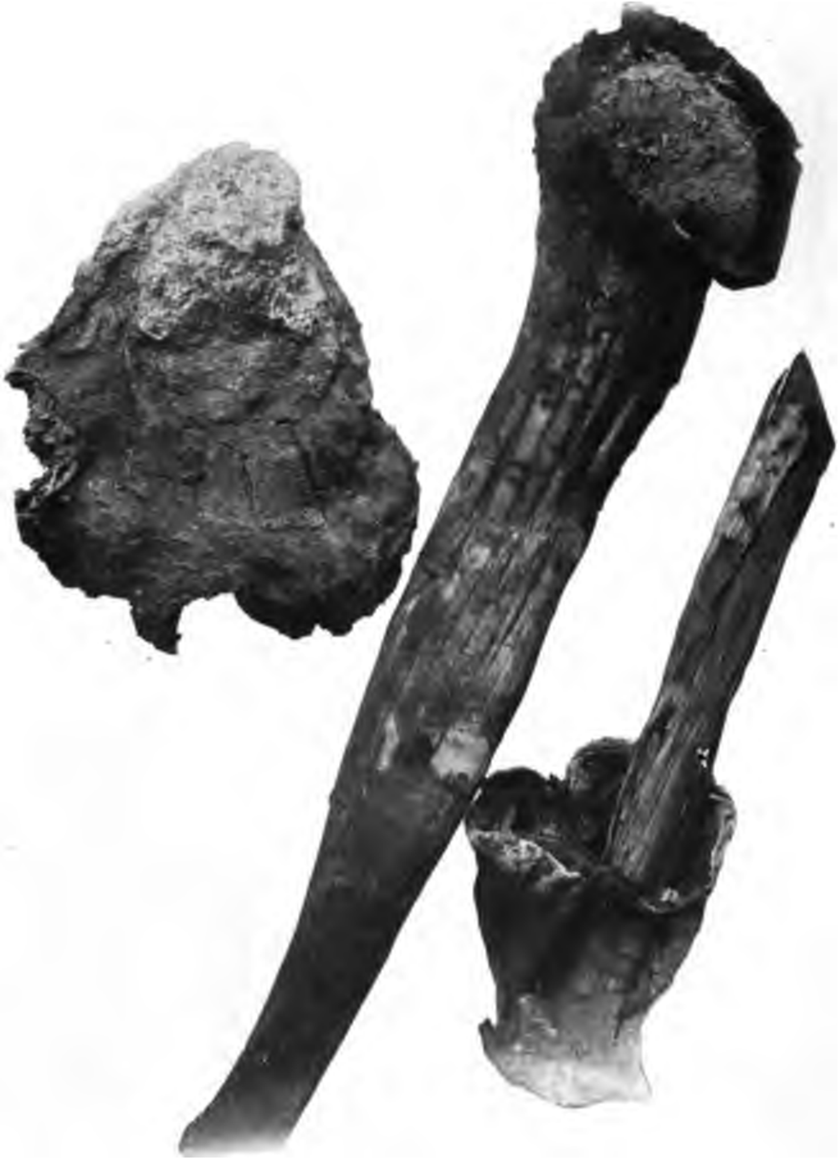

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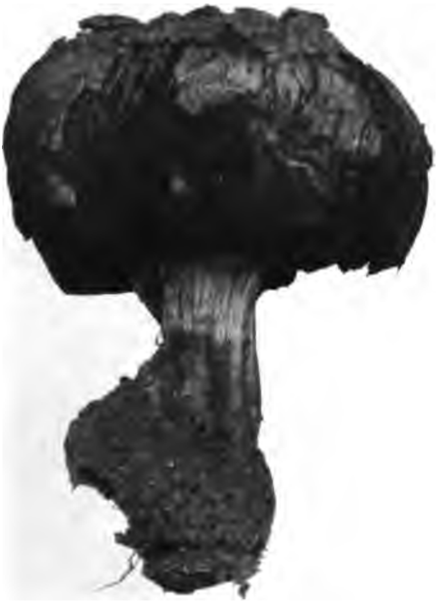

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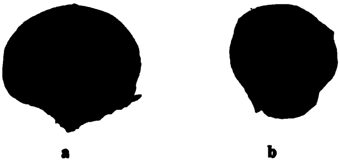

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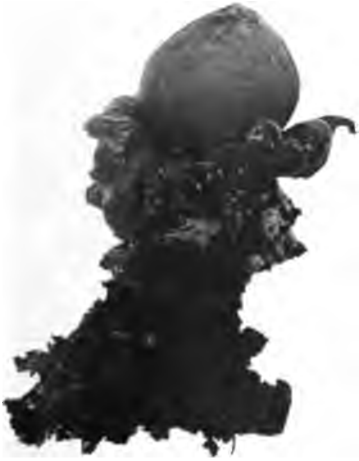

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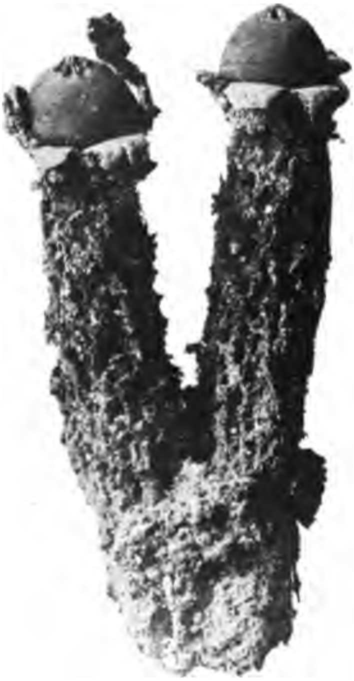

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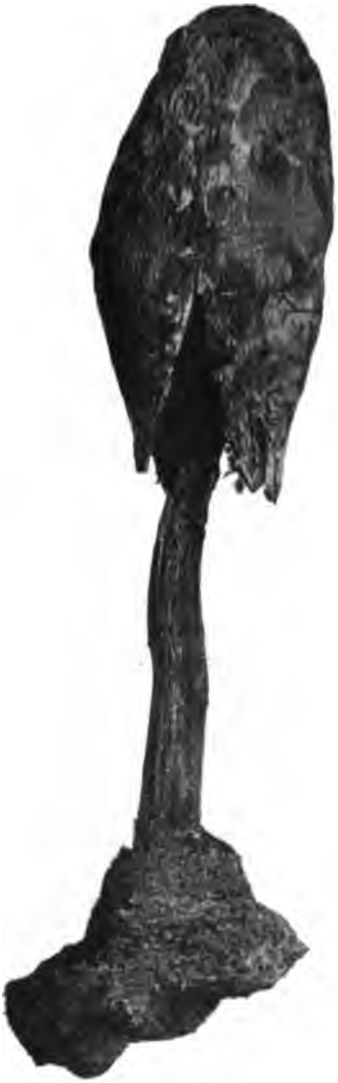

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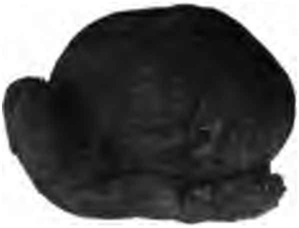

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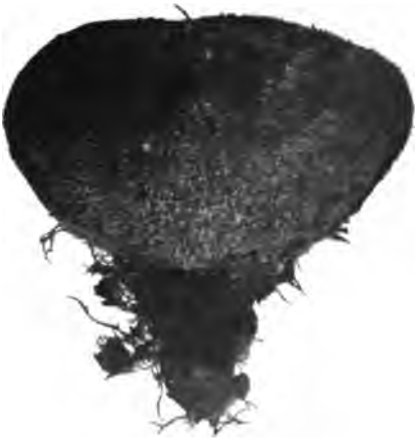

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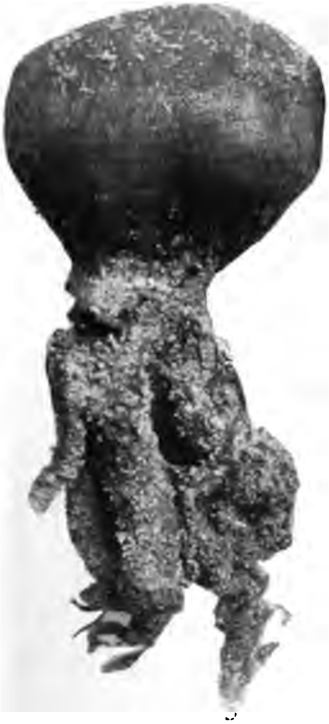
PLATE 7.



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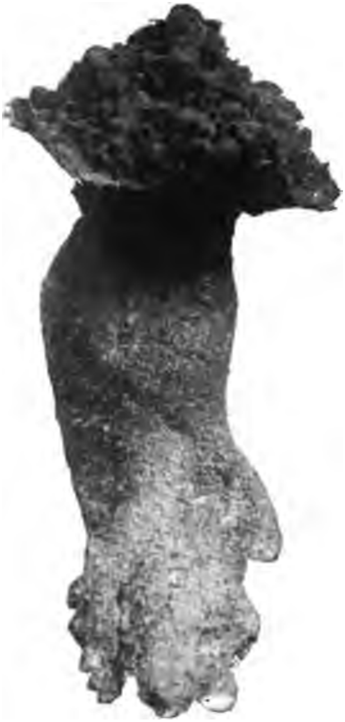

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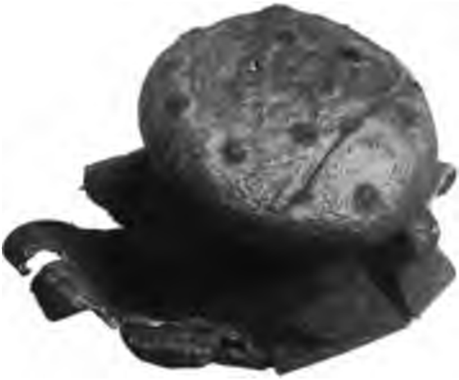
PLATE 8.



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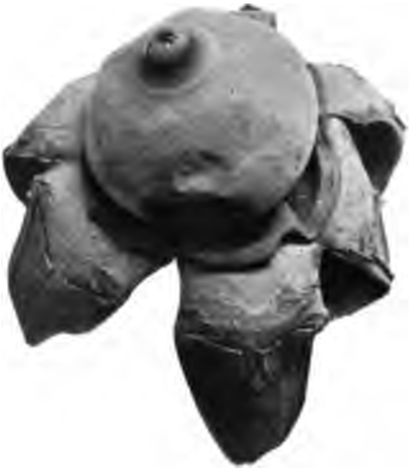

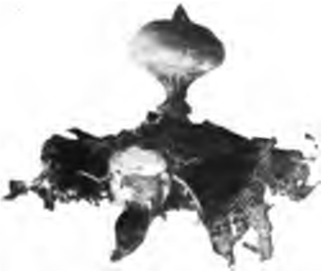

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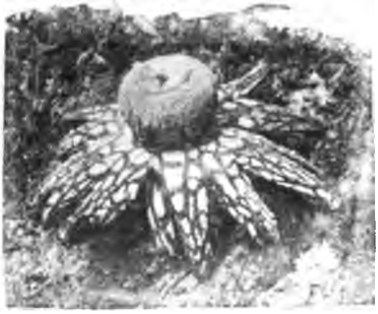

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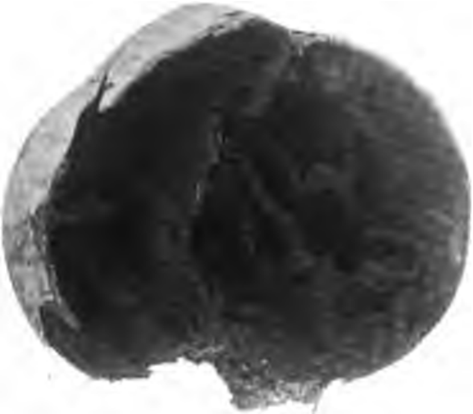

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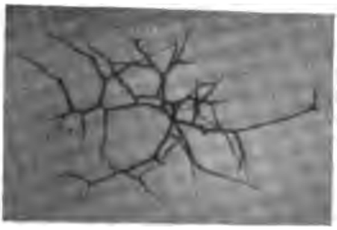

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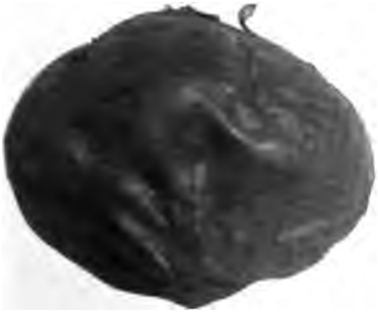

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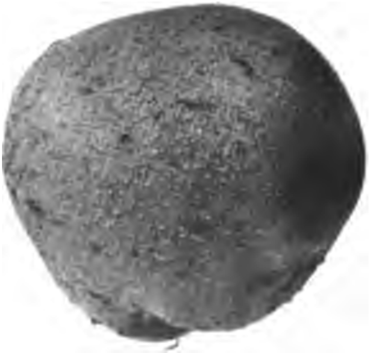

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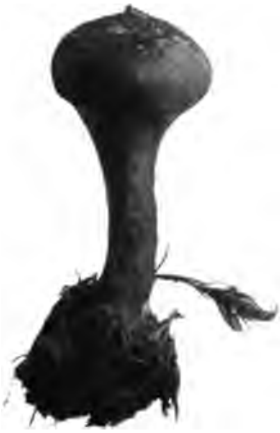
PLATE 10.



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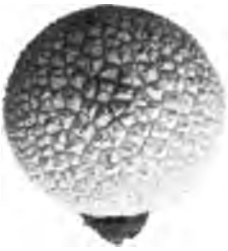

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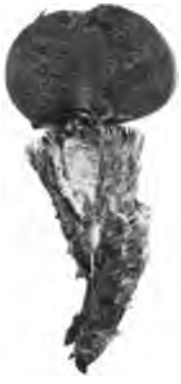

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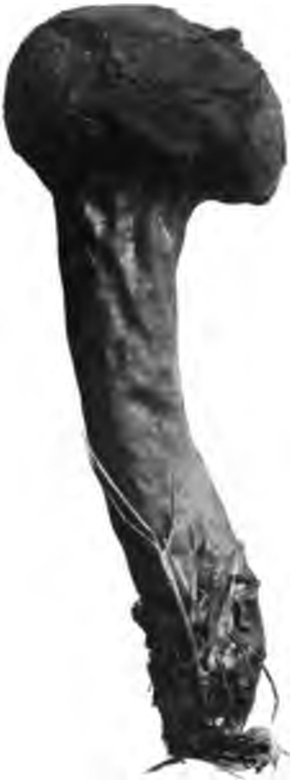

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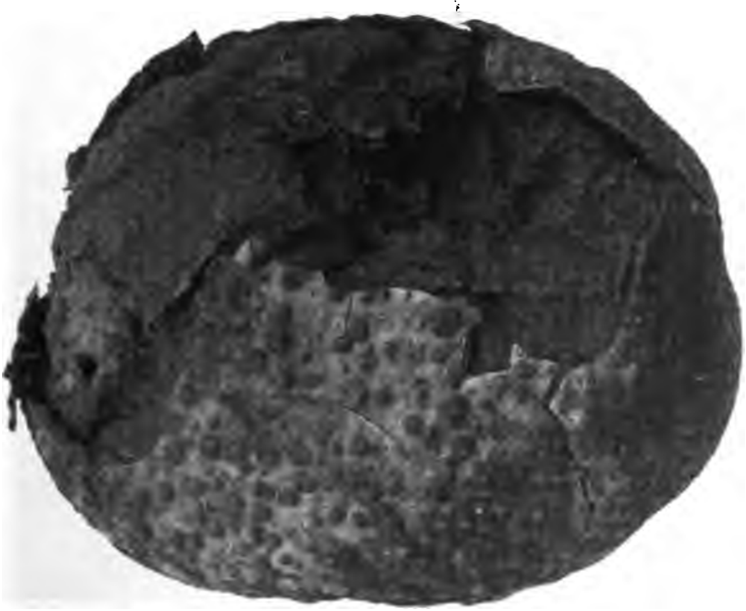

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BULLETIN No. 5.   JUNE, 1902.   MYCOLOGICAL SERIES, No. 2

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J. U. & C. G. LLOYD
CINCINNATI, OHIO

MYCOLOGICAL SERIES, No. 2

THE GEASTRAE

Illustrated with 80 figures

By C. G. LLOYD

GEASTRAE.

We have classed the Geastrae as a sub-tribe of the Lycoperdeae, the essential characters of which are plants sessile, spores mixed with capillitium. (See "The Genera of Gastromycetes, p. 11.)

Geastrae differ from the other Lycoperdeae in having the outer peridium thick, permanent, and when the plant ripens the outer peridium peels away from the inner, splits into segments and becomes more or less recurved or spreading.

THE MYCELIUM.

There are two distinct types of mycelium. Most Geastrae develop under the ground and the mycelial threads proceed from every portion of the outer peridium binding it to the soil. This is the usual type of most Geaster mycelii. In some species however, (see Fig. 57) the mycelium proceeds only from the base of the plant, and has the appearance of large cord-like roots.

THE OUTER PERIDIUM.

There are three distinct layers forming the outer peridium of a Geaster and they are quite evident to anyone who will closely observe them.

1st, the mycelial or outer layer,
2nd, the fibrillose or middle layer,
3rd, the fleshy or inner layer, also called the Collenchyma.

THE MYCELIAL LAYER.—This derives its name from the fact that in many cases in the growing plants, mycelium threads proceed from all parts of it and bind the plant to the surrounding soil. In plants of the section *Rigidae* it is fragile, and so closely attached to the soil that as the plant expands it tears away from the mycelial layer which remains attached to the soil. In herbarium specimens (see Fig. 8) of Geaster hygrometricus and others of the *Rigidae*, the outer peridium appears smooth, the mycelial layer having entirely disappeared. In most Geasters however, the mycelial layer remains more or less firmly attached to the fibrillose but the degree of attachment in different specimens, otherwise the same, is of no importance, merely a condition. In Geaster limbatus, most of the specimens have the two layers adnate but we have specimens that have the mycelial layer only slightly attached at the extremities of the segments, and specimens also where it has entirely peeled off. In some species, (fornicatus coronatus, radicans in particular) the mycelial layer remains as a cup, the fibrillose layer separates and arches up, tearing away, except at the tips of the segments which remain attached. Species with this character are called fornicate, and as it seems to have been supposed to have been the character of only one species called fornicatus, several have been confused under this name. As a matter of fact quite a number of species have this character in a more or less perfect degree. All Geasters have an outer layer which for uniformity we call the mycelial layer, though inaccurately so-called in cases like G. radicans where the mycelium is basal.

THE MIDDLE OR FIBRILLOSE LAYER.—This is usually the thickest and principal layer of the outer peridium and in many herbarium specimens is the only one that remains, the outer and inner layers having peeled off and disappeared. Its nature varies much in different species. In the *Rigidae* it is firm, thick, strongly incurved when dry, and strongly hygroscopic. When the plant is moist the segments reflex, and they curl in again when dried, and the process can be repeated as often as the plants are moistened and dried. Fig. 5 represents a dried plant as found in the herbarium, Fig. 6 is the same plant after having been moistened. All Geasters are to an extent hygroscopic and the simplest way to make a crushed specimen assume its normal shape is to place it a few minutes in a jet of free steam which puffs them out plump and natural. The photographs of many of the specimens we present would not be supposed to be the same specimen we received. In most species of Geaster the fibrillose layer instead of being firm as in *Rigidae* is to an extent flexible and in the only specimen we have seen of "G. turbinatus" it resembles parchment paper.

THE INNER OR FLESHY LAYER—This layer differs very much from both of the preceding. When the plant opens it is thick, soft, fleshy, usually white or pinkish. As it dries it almost always turns dark reddish brown, dries down to a thin adnate layer, or splits up and peels off entirely or partially. A photograph of a Geaster taken with this layer fresh is quite different from the photograph of the dried specimen of the plant. Sometimes instead of drying down to a thin layer, if exposed to the weather it thickens, becomes spongy, torn. This is particularly the character of the fleshy layer of G. rufescens. In many species if specimen of the plant be dried when it first opens, the fleshy layer remains as a thin red adnate layer, whilst if left exposed to the weather the layer peels off and disappears entirely. Specimens collected in these different conditions appear like different plants. Sometimes the fleshy layer separates from the fibrillose, and remains as a kind of cup at the base of the inner peridium. This is purely an accidental character and while present in many specimens (see Fig. 47) is absent in others. It is the basis for such species as G. triplex, and made the *key character* in Saccardo. While we consider G. triplex a good species, it is on entirely different points from this feature, from which it receives its name.

Fig. 60 shows a specimen of G. coronatus in which a portion of the fleshy layer in peeling off has chanced to tear in a circumscissile manner and dried as a separate ring, which being too small to slip over the inner peridium remains as a loose collar at its base. It is needless to say that this is purely accidental and might never occur in another specimen.

THE INNER PERIDIUM.

The inner peridium of Geasters is generally dull, flaccid, soft. It is either globose or more or less ovate, often tapering to the base. Sometimes it is pedicellate, sometimes sessile and this feature is a primary character in several authors' classification. I do not however, feel that it is of primary importance for I think the length of the pedicel, in some species, is dependent largely on the extent that the outer peridium is reflexed or drawn away from the inner. Geaster rufescens I believe varies in having the inner peridium sessile or distinctly pedicellate.

THE MOUTHS OF THE INNER PERIDIUM are of three types. 1st, not defined but simply a torn aperture; 2nd, distinct, usually conical, but even. 3rd, strongly sulcate. I think Geasters are more strongly characterized by their mouths than by any other feature. In addition some Geasters have the mouths seated on a definite circular area strongly marked, and differing in shade of color from the balance of the inner peridium. Such mouths we call definite. In others the mouth is conical and distinct but is not marked with a definite area. Such we call indefinite. While the various species are characterized by having in general definite or indefinite mouths we think it is not rare that individual plants of a species usually having indefinite mouths may have a definite mouth or vice versa.

In addition to these characters above we read of ''dentate'' mouths especially in connection with G. rufescens, and such a mouth is clearly shown on Schmidel's drawing. We believe however, that it is purely in error, and as that error has been handed down in our descriptions for 150 years it is time we were rid of it.

We also read of fimbriate mouths, especially in connection with G. fimbriatus. Most Geasters of the even-mouthed series have appressed hairs around the mouth, and when the plant is old and weather worn these hairs become frayed and take on a fimbriate appearance, but that it is a character, I do not believe.

We have seen specimens with an even mouth, rimose, and appearing at first sight as if sulcate. That is simply the result of the way the plant dries and its occurrence is rare. It was from such a specimen Schaeffer (1761) drew his figure on which G. coronatus (fornicatus of many authors) was based, and hence the error that persists for 140 years that ''Geaster fornicatus has a sulcate mouth.'' No fornicate species of Europe has to my knowledge a sulcate mouth.

''Pectinate'' mouth is a term used in connection with Geasters. A pectinate mouth would be composed of narrow segments set parallel like the teeth of a comb. Such mouths are often shown in illustrations, as in Chevallier's cut of ''G. minimus'' and in Massee's beautiful but inaccurate figures of Geasters in the Annals of Botany. We do not think that such a mouth occurs in nature but are exaggerated conceptions of sulcate mouths. A plant with a sulcate mouth might have the divisions broken apart and thus become ''pectinate,'' but we have never seen one and do not believe they occur.

CAPILLITIUM.

With the exception of the anomalous species, hygrometricus, the capillitium of Geasters consists of long unbranched threads that proceed from the columella and inner surface of the peridium.

The capillitium, in some species at least, is more firmly attached to the peridium and columella than usual in most Gastromycetes. Cut open a Geaster, shake out the spores, and with a hand glass abundant capillitium can be seen proceeding from both columella and peridium. Fragments of these threads are mixed with the spores, and these fragments as seen under the microscope are usually simple, cylindrical and tapering. The relative thickness of the threads as compared to the spores, we give in our descriptions as a matter of form. We place little value on it however, as the threads as well as the spores may vary in thickness.

SPORES.

With the exception of the anomalous species, hygrometricus, the spores of the species we have examined are very similar, all globose, all slightly warted, all about 3-5 mc. in diameter. Some are slightly larger than others, some slightly rougher than others, but the differences while evident by contrast are not sufficient to determine specific characters. Cooke describes species from Australia with ''smooth'' spores. We have never seen a perfectly smooth spore in a Geaster. G. hygrometricus can be known at once by its large rough spores 8-12 mc. in diameter.

The color of the spore mass of Geasters affords no distinction as it does in other genera. We find no species with pronounced olive or purplish spores. The usual color is a dark brown deepening to black.

COLUMELLA.

In our opinion one of the most striking points of difference between species is the shape of the columellæ, which varies from ovate, globose, or filiform. To study the columellæ however, the plant should be examined just before it expands. After the spores ripen the columellæ usually become indistinct. Vittadini seems to have been the only author who has observed and illustrated the columellæ in his plates.

SHAPE OF UNEXPANDED PLANT.

If we knew the shapes of the unexpanded plants, the best primary division of the genus would be in two sections. Plants with unexpanded forms, globose (see Fig. 41) and plants with unexpanded form, acute (see Figs. 48, 77). Unfortunately, however, we only know the unexpanded form of a few species, simply from lack of observation. We call attention of collectors especially to this point that in gathering Geasters it is particularly important to secure a few unexpanded plants or to make a note of their form. We hope should we issue a second edition of this pamphlet that we may have the data, and not be forced to admit our ignorance on this character of many of the species.

CLASSIFICATION.

The Geastrae consist of only two Genera, Myriostoma with but a single widely distributed species, and Geaster of which we are familiar with 22 species, and know imperfectly several others.

Geaster hygrometricus differs from other species widely in its internal structure It has no columella, (neither has other species) the capillitium is branched and interwoven and in mature specimens scanty as compared to other species; the spores are larger and approximate the spores of Scleroderma, and the spore mass closely resembles to the eye that of a Scleroderma. In De Bary's Morphology (English, 1887, pp. 313 and 314,) the points are clearly brought out. Morgan (1889) proposed for it the name Astraeus. Desveaux had many years before (1809) proposed the same thing and Corda (Icones Vol. 5) elaborated it, only they retained the name Geaster for this species, proposing to change the other species to Pleastoma. We do not feel that Geaster hygrometricus ought to be separated from other species which it so closely resembles in general appearance that it was for years confused with them, and which to-day frequently requires the use of the microscope to distinguish from other species We certainly do not think it ought to be put in a different order (we do not use the word natural) as Fischer proposes, and if we did we would not put Nidulariaceae between it and Geaster.

KEY TO GENERA.

Mouths and pedicels several . . . . Myriostoma.
Mouth and pedicel one . . . . Geaster.

MYRIOSTOMA COLIFORMIS.

Exoperidium usually recurved, cut to about the middle to six to ten lobes; if collected and dried when first open rather firm and rigid; when exposed to weather, becoming like parchment paper by the peeling off of the inner and outer layers. Inner peridium, subglobose, sup-

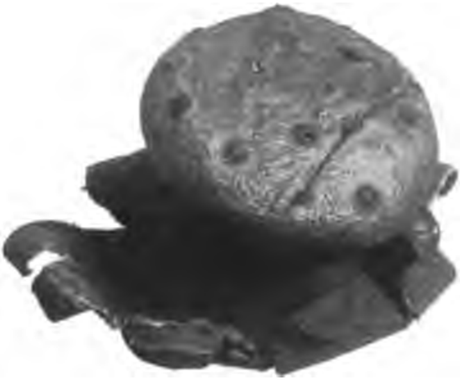

Fig. 1.
Myriostoma coliformis.

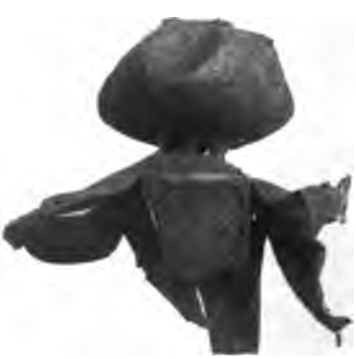

Fig. 2.
Myriostoma coliformis.

ported on several, more or less confluent, pedicels. Surface minutely roughened; mouths several, appressed fibrillose, round, plain or slightly elevated; Columellae several, filiform, probably the same in number as the pedicels; spores globose, roughened, 3-6 mc.; capillitium simple, unbranched, long, tapering, about half diameter of spores.

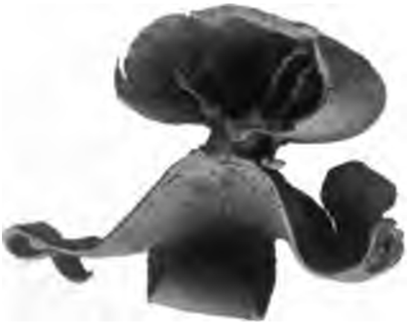

Fig. 3.
Myriostoma coliformis (section showing columellae.)

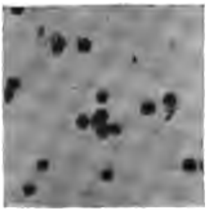

Fig. 4.
Myriostoma coliformis, (spores magnified.)

The inner peridium with its several mouths can be, not inaptly, compared to a "pepper-box." The specific name is derived from the latin *colum*, a strainer, and the old English name we find in Berkeley "Cullenden puff-ball" refers to a cullender (or colander more modern form) now almost obsolete in English but meaning a kind of strainer. This plant is first mentioned by Doody (in the appendix to Ray's Syn. 2nd Ed., 1696.*) Dickson (†) 1785, beautifully illustrated the plant and as it is such an odd plant it has never been confused in literature. Dickson called it Lycoperdon coliforme. Persoon (Syn. 1801) refers it to Geaster, and Desveaux (1809) proposed for it the genus Myriostoma. At the present day it is generally known as Myriostoma coliformis, though some writers (strangely to our mind) still continue to call it Geaster coliformis.

Geographical Distribution.

In Europe the plant is reported from England, Holland, Germany, and Poland, and develops abundantly in the sandy plains of Hungary. In England it is a very rare plant. In this country species were sent to Chas. Peck from Colorado. We have it from Dakota and abundantly from Florida.

Specimens in our Collection.

Florida, (many specimens) Mrs. Delia Sams.
Dakota, Black Hills, Prof. T. H. McBride.
Hungary, magnificent specimens, Dr. L. Hollos.

Explanation of Figures.

Figs. 1 and 2 plants natural size; Fig. 3 Section showing columellæ; Fig. 4 Spores magnified 450 diameters. Specimens all from Mrs. Delia Sams, Florida. All figures in this pamphlet are natural size unless otherwise specified. All micro-photographs are by Dr. Edward H. Thompson.

(*) The previous citations of Ray to Merrett (1667) is more probably a Geaster.
(†) Fasc. Plant, Cryp. Britanniae.

GEASTER.

Exoperidium thick, divided into sections and usually recurved away from the inner peridium. Inner peridium sessile or stipitate with a single pedicel. Mouth only one. Capillitium (mostly) simple, unbranched. Spores globose, rough. We would divide the genus primarily into two sections.

Rigidae (see following).
Non-Rigidae (see page 14).

SECTION 1. RIGIDAE.

Exoperidium rigid, strongly incurved when dry, strongly hygroscopic.

This section is a very natural division of the genus readily recognized by the rigid incurved exoperidium segments of the dried specimens. All species of Geaster are hygroscopic to a more or less extent, but these are strongly hygroscopic. The mycelium covers the entire young plants and the layer is thin. When the plant expands the mycelium layer tears off and remains as fragments attached to the soil, hence the plants of this section as found in collections are smooth externally, and entirely devoid of mycelial layers.

Spores large, (8–12 mc.)	(1) hygrometricns.
Spores small, (4–6 mc.)	
Mouth indeterminate,	(2) delicatus.
Mouth strongly sulcate,	(3) Drummondii.
Mouth definite, even,	(4) mammosus.

1. GEASTER HYGROMETRICUS.

Unexpanded plant globose. Mycelium layer, thin, tearing away as the plant expands. Fibrillose layer thick, rigid, strongly hygroscopic, splitting into six to twenty segments becoming reflexed when the plant is moist; strong incurved and rigid when dry. Flesh layer thin, soon separating and often absent from herbarium specimens. Inner peridium globose, thin, opening by simply a torn aperture; columella none. Capillitium threads long, branched, about half diameter of largest spores. Spores large, globose, rough, 8–12 mc.

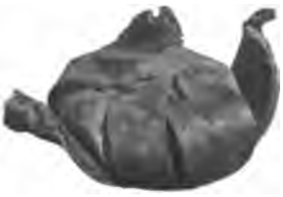

Fig. 5.
Geaster hygrometricus (dried specimen.)

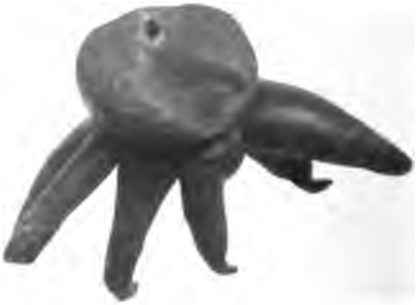

Fig. 6.
Geaster hygrometricus (expanded specimen.)

This plant is fond of sandy localities and very common in many places. It develops under the ground and is of slow growth. Young plants received from W. N. Suksdorf grew in clumps, (see fig. 10) but that this is exceptional, or usual, we do not know. The young plants are liable to be taken at first for a species of hypogaeal fungi, or on examination under a microscope for an undeveloped Scleroderma. The genus Diploderma was based on unopened specimens of this plant and Cycloderma on unopened specimens of other Geasters. The general resemblance of the spore glass to that of a Scleroderma is close, for the large rough spores are very similar, and the capillitium is so relatively scanty, that when a piece of gleba is pressed on a glass often only spores can be seen. The capillitium however can be readily floated out by method described in foot note on page 7 of "Gastromycetes Genera."

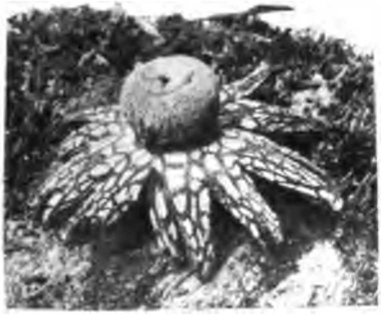

Fig. 7.
Geaster hygrometricus (as it grows.)

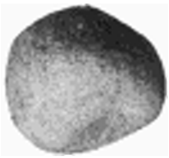

Fig. 8.
Geaster hygrometricus (unexpanded.)

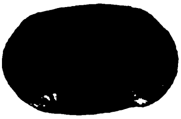

Fig. 9.
Geaster hygrometricus (section, unexpanded.)

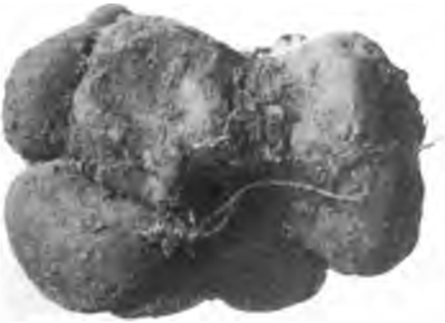

Fig. 10.
Geaster hygrometricus (unexpanded, caespitose plants.)

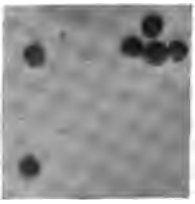

Fig. 11.
Geaster hygrometricus (spores magnified.)

The plant ripens in late summer or fall of the year, and the thick outer peridium splits into segments, sometimes as few as four, sometimes as many as twenty. They are strongly hygroscopic and in moist weather recurve and standing on their tips lift up the inner ball. In dry weather they closely curve in, clasping the ball, and they will repeat this as often as the conditions become moist or dry. Hence they are called "hygrometricus" and frequently by children "poor–man's weather-glass." Miss Marshall in St. Nicholas states that in the closed condition they are carried along by the wind and applies to them the name of "Fair weather travellers." Plants persist often during winter and one observing them in the spring expanding under the influence of moisture may take them for growing plants. They become "weather-worn," the inner surface of the exoperidium cracked in numerous areas, the surface of the inner peridium frayed and fibrillose. It is a weather-worn specimen that Schweinitz named "Geaster fibrillosus."

Geographical Distribution.

The plant is cosmopolitan. Common throughout Europe, it is more rare in England than on the continent. In this country it occurs from coast to coast and from Canada to Mexico. Locally however, it has never been found in the immediate vicinity of Cincinnati.

Specimens in our Collection.

Massachusetts, Miss Cora Clarke, Mrs. Chas. Cheney, Simon Davis, Walter Deane. *Connecticut*, James B. Rorer. *New York*, Ella K. Hays. *Pennsylvania*, Ellen M. Dallas. *Maryland*, C. L. Shear. *Minnesota*, Minn. Bot. Survey. *Tennessee*, S. F. Corly. *Georgia*, Roland M. Harper. *Florida*, Mrs. Delia Sams, H. C. Culbertson, P. H. Rolfs, C. G. Lloyd. *Colorado*, C. F. Baker. *Washington*, W. N. Suksdorf. *Illinois*, L. H. Watson.

France, N. Patouillard, F. Fautrey. *Tirol*, Rev. G. Bresadola. *Hungary*, Dr. L. Hollos.

Explanation of Figures.

Fig. 5. A plant of our collection from Walter Deane, Cambridge, Mass. Fig. 6. The same plant when moistened. Fig. 7. Photograph of plant in situ, by F. J. Braendle, Washington, D. C. Fig. 8. Unexpanded plant. Fig. 9. Section of same. Fig. 10. A cluster of unexpanded plants, from W. N. Suksdorf, Washington. Fig. 11. Spores magnified 450 diameters.

GEASTER HYGROMETRICUS VAR. GIGANTEUS.

A large form, differing from the ordinary plant only as to size, frequently reaches us from the Western States. It is so much larger than the usual plant that we think is entitled to a distinctive name. This large plant does not grow in Europe to our knowledge.

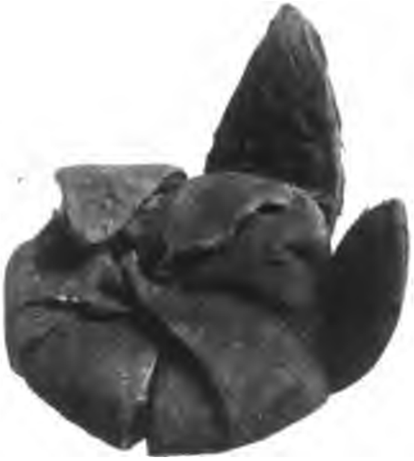

Fig. 12.

Geaster hygrometricus var. giganteus, (unexpanded)

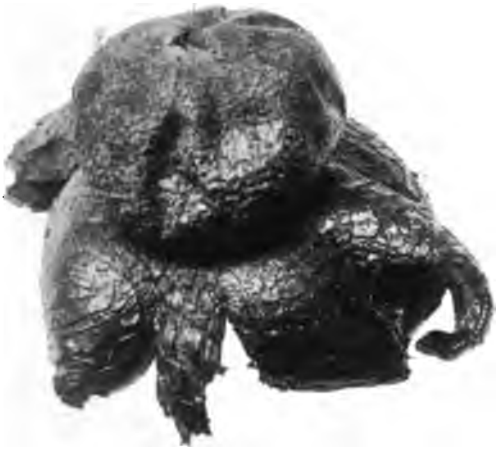

Fig. 13.
Geaster hygrometricus var. giganteus (expanded.)

Specimens in our Collection.

California, L. A. Greata.
Washington, W. N. Suksdorf.
Iowa, T. H. McBride.

Explanation of Figures.

Fig. 12. Geaster hygrometricus var. giganteus, specimen, from L. A. Greata, Los Angeles, Cal.

Fig. 13. The same after expanding by moisture.

2—GEASTER DELICATUS.

Outer peridium thin, smooth, firm, hygroscopic, cut (about ⅔ deep) to 8–10 segments. Spreading when moist, incurved when dry. Inner peridium subglobose, opening by a plane, indefinite aperture. Columella none. Capillitium slender, interwoven, simple or sometimes slightly branched near the end, slightly thinner than the spores. Spores globose, minutely warted, 5–6 mc.

This elegant little species is known only from the Northwest. It was described by Prof. Morgan from specimens received from Nebraska. Hollos considers this plant a synonym of G. lageniformis of which he sends specimens. (*) It seems to me however that the plants while *very close* are different. Lageniformis has a protruding mouth. Delicatus the mouth is indefinite, plane, merely an aperture, the same as G. hygrometricus. We admit that the two plants are very close, probably the same, but for the present would keep them distinct. Had Morgan had access to Vittadini's figure we should not have blamed him for describing the plant he met as a new species. The figure is an

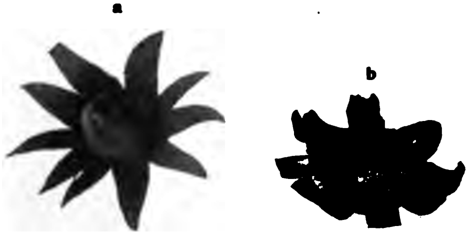

Fig. 14.
Geaster delicatus.

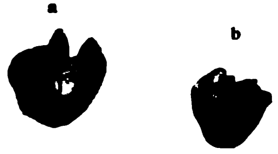

Fig. 15.
Geaster delicatus (unexpanded.)

(*) See Appendix.

elongated, oval plant with a protruding mouth. Delicatus is a depressed globose plant with no protruding mouth.

From G. mammosus which this plant closely resembles in general, having the same thin hygroscopic peridium, it can be distinguished by its mouth. From small specimens of G. hygrometricus with which it agrees as to its mouth, it can be at once distinguished by its thin peridium and small spores.

Specimens in our Collection.

Washington, W. N. Suksdorf. *Nebraska*, Chas. E. Bessey, (given us by A. P. Morgan).

Explanation of Figures.

Fig. 14. Geaster delicatus expanded. Fig. 15. Same unexpanded.
a—Specimen from Chas. E. Bessey, Nebraska.
b—Specimen from W. N. Suksdorf, Washington.

3—GEASTER DRUMMONDII.

Exoperidium rigid, hygroscopic, strongly incurved when dry, cut (about ⅔ deep) to usually ten linear segments. Mycelium and fleshy layers absent in all specimens I have seen. Inner peridium globose, smooth, firm, sessile, having a short, conical, strongly sulcate mouth, not seated on a definite area. Columella linear (?) (*). Capillitium simple, tapering, about thickness of spores in thickest part. Spores globose, rough, 5–7 mc.

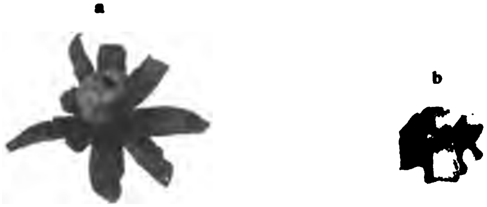

Fig. 18. Geaster Drummondii.

The little plant is apparently rare. I first received it under the name striatulus from Dr. Hollos, Hungary. Afterwards I found it in Ellis' Exs. (No. 110) in Washington, Philadelphia and New York, labeled mammosus, (cfr. Myc. Notes, p. 71, No. 162, where however, the reference to Ellis' exsiccatae is given in error as 109). Hollos who is familiar with this small plant in Hungary, has examined specimens of G. Drummondii of Berkeley from Australia, and pronounced it the same plant, only larger specimens. We really see no essential difference in Cooke's description (save size) of the two plants in "Australian Fungi", and we believe Berkeley's illustration in Hooker's Journal is this plant. We think there is no question but that Kalchbrenner had the plant in view in his description of striatulus, (Grev. vol. 9, p. 3,) though he gives a wrong synonym. Henning beautifully illustrates the little plant from South Africa under the name G. Schweinfurthii, (Eng. Bot. Jahrb. Vol. 14, t. 6, f. 7.)

(*) Very indistinct in specimens examined and not clearly made out.

Geographical Distribution.

Hungary, (Hollos). Australia, (Kalchbrenner). South Africa, (Henning). New Jersey, (Ellis).

Specimens in our Collection.

Hungary, Dr. Hollos.
Florida, Specimens from A. P. Morgan, (I am in some doubt as to these specimens, they are not so typically hygroscopic as all others I have seen.)

Explanation of Figures.

Fig. 18. Geaster Drummondii. a—Expanded. b—Unexpanded. Specimens from Dr. L. Hollos, Hungary.

4—GEASTER MAMMOSUS.

Exoperidium thin, rigid, hygroscopic, smooth, divided almost to base into about ten linear segments, often umbilicate at the base as shown in fig. 17b. Inner peridium globose, smooth, sessile, furnished with a conical, even, protruding mouth seated on a definite area. Columella short, globose, evident (though indistinct in mature plants). Capillitium simple, tapering, hyaline, often flattened, slightly thinner than the spores. Spores globose, roughened, 3–7 mc. (*)

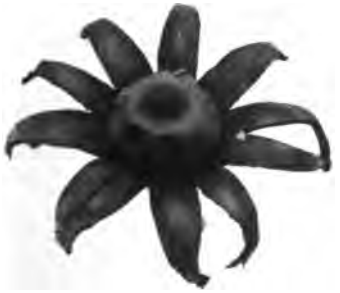

Fig. 16.
Geaster mammosus, (expanded.)

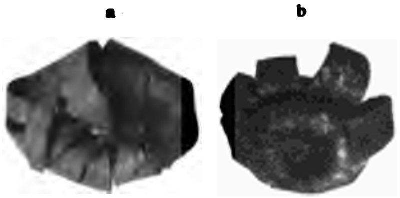

Fig. 17.
Geaster mammosus (unexpanded.)

This plant differs from other hygroscopic species by its *even* conical mouth. The plant was early (1809) beautifully illustrated by Sowerby (t. 401). Fries (1829) gave the name Geaster mammosus to some plant, but not to this, as he describes it as drying with the exoperidium reflexed, and refers Sowerby's characteristic plate, doubtfully, to Geaster hygrometricus. Chevallier (1836) clearly describes and characterizes its difference from hygrometricus by its mouth. He is usually (and justly in our opinion) cited as the author of the name. Vittadini (1843) gave a fine figure of the plant, but strangely in his text states that it is the Friesian interpretation of the plant and "not Chevallier."

(*) Morgan states 5–6 mc. We have specimens from Canada where the spores vary *in the same plant* from 3 to 7 mc. in diameter. Our English specimens run more uniform, 3 to 4 mc.

Geographical Distribution.

This plant is distributed through Europe and United States. (*)

Specimens in our Collection.

Canada, Wm. Dearness. *Minnesota*, Minn. Bot. Survey. *Iowa*, W. J. Teeters. *Pennsylvania*, Dr. Wm. Herbst. *California*, L. E. Benton, (specimen from A. P. Morgan).

England, Chas. Crossland. *Hungary*, Dr. L. Hollos.

Explanation of Figures.

Fig. 16. Geaster mammosus, expanded. Fig. 17. Same, unexpanded. Fig. 16 and 17b. Specimens from Chas. Crossland, England. Fig. 17a. From John Dearness, Canada.

SECTION 2.—NON-RIGIDAE.

This section is readily recognized from the previous by the segments of the exoperidium not drying strongly incurved over the endoperidium. Two species which we include in this section (Smithii and arenarius) have a strong tendency toward the previous section, but the tips only of the exoperidium segments dry incurved, not the entire exoperidium. We divide the section into two subsections.

Mouths sulcate (see following)
Mouths even, (see page 22.)

SPECIES WITH SULCATE MOUTHS.—NON-RIGIDAE.

Plants of this section are distinguished from the following section by the sulcate (not even) mouths. It is a question if the same plant under different conditions cannot have a mouth that varies, sulcate or even. If that is so then Geaster Morganii becomes G. lageniformis and Geaster arenarius becomes G. Smithii. We think while it is possible it is not proven, for our observation is that plants of the same collection have mouths either all sulcate, or all even.

Omitting from discussion at present G. Morganii (which differs in being truly sessile and usually saccate) and G. Smithii, (which is unique in itself,) there remains in this section G. pectinatus, G. Bryantii, G. Schmidelii and G. asper. These four plants no doubt should be truly considered as forms of one species, but as they never run into each other so closely that there is trouble in naming them, we think it better to present them as distinct species. At the same time they have been so confused in literature it is almost a hopeless task to straighten out the tangled threads. All have strongly sulcate beaked mouths, all pedicels either short or long, all exoperidia usually revolute. All are covered partly in the text and partly in citations of Fries "striatus" and no doubt that conglomerate species of Fries is responsible for the confusion that has since existed.

KEY TO THE SPECIES.

Mouth long beaked, pedicel slender, inner peridium usually striate beneath,	(5)	pectinatus.
Mouth long beaked; pedicel slender; inner peridium with a circular groove beneath,	(6)	Bryantii.
Mouth short beaked; pedicel short, thick; peridium neither striated nor grooved,	(7)	Schmidelii.
Mouth short beaked; inner peridium short pedicellate, asperate	(8)	asper.
Mouth conical, inner peridium sessile,	(9)	Morganii.
Mouth flattened conical, depressed,	(10)	Smithii.

(*) Notwithstanding Massee's statement "The North American specimens under this name are certainly not the true species."

5—GEASTER PECTINATUS.

Exoperidium revolute, cut about to the middle into 8 to 10 segments. Mycelial layer generally adnate, carrying with it soil. Fleshy layer thin, finally peeling off, and partly peeled off in most specimens giving them a ragged appearance. Pedicel slender. Inner peridium subglobose but somewhat tapering into the pedicel and marked with striae at the base, either faintly or strong enough to be called ridges. Mouth strongly sulcate, beaked, or slender conical. Capillitium slightly thicker than spores. Spores globose, rough, 5–6 mc. in diameter.

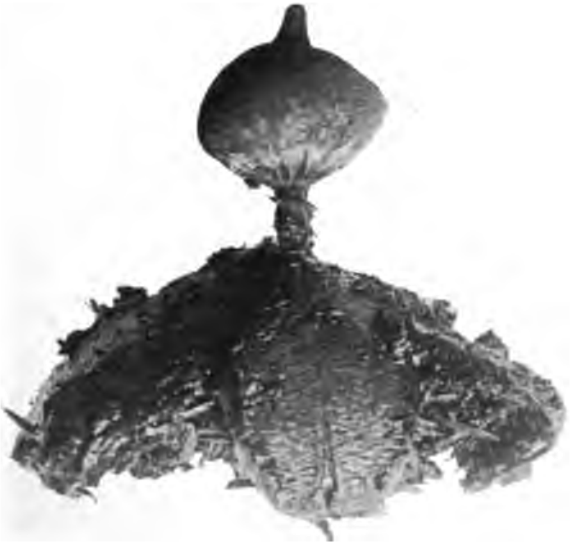

Fig. 19. Geaster pectinatus (large plant)

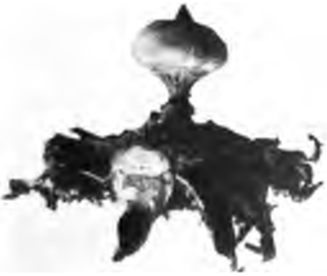

Fig. 20.
Geaster pectinatus.

Fig. 21.
Geaster pectinatus.

Fig. 22.
Geaster pectunatus (small plant.)

Schmidel (1747) gave four figures (t. 37, f. 11–14) excellently illustrating this plant Persoon (1801) called these figures Geaster pectinatus. Fries mixed it up with three other species under the name G. striatus and since Fries' day it has been so badly confused that we can only refer our readers to the references in appendix for details.

Hollos states that G. pectinatus is "a fungus of so rare occurrence it was quickly forgotten." It is undoubtedly a rare plant, we do not remember having seen a specimen in any of the Eastern collections, and yet we find we have five different gatherings, in our own collection. Miss Caroline A. Burgin of Philadelphia and Mrs. Delia Sams of Florida are the only collectors of the plant in this country to our knowledge.

Geographical Distribution.

Europe and the United States, rare in both countries.

Specimens in our Collection.

Pennsylvania, Miss Caroline A. Burgin. *Florida*, Mrs. Delia Sams.
Tirol, Rev. G. Bresadola. *France*, E. Boudier. *Sweden*, L. Romell.

Explanation of Figures.

Fig. 19. Large plant from L. Romell, Sweden. Figs. 20 and 21. Specimens from Caroline A. Burgin, Pennsylvania. Fig. 22. A small plant, specimen from Mrs. Delia Sams, Florida.

6—GEASTER BRYANTII.

Exoperidium similar to preceding species. Pedicel slender. Inner peridium subglobose, or somewhat abrupt at base, marked with a circular groove at the base. Mouths sulcate, beaked. Capillitium and spores as in the preceding.

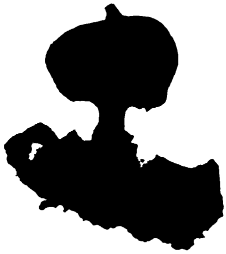

Fig. 23. Geaster Bryantii

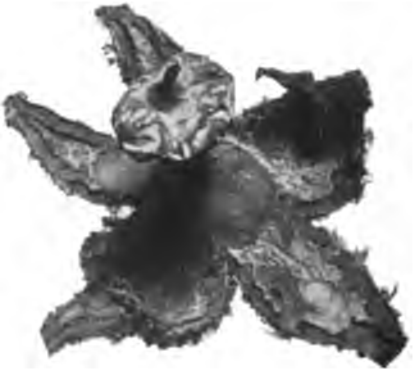

Fig. 25. Geaster Bryantii.

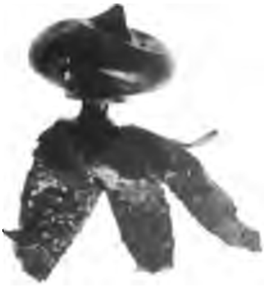

Fig. 24. Geaster Bryantii.

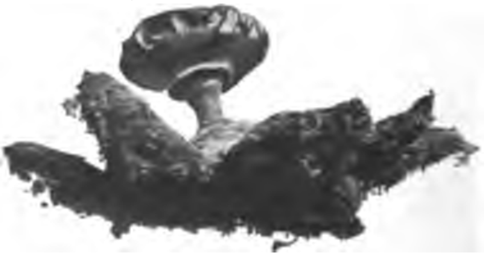

Fig. 26. Geaster Bryantii.

This plant is so close to the preceding that I am convinced it might more properly be considered a variety of it. Its distinctive feature the groove at base of peridium, is formed by the pedicel expanding to a disk shape top supporting the inner peridium, which being smaller where it is united forms a groove. It is the original of De Candolle's Geaster striatus, particularly as regarding his citations, but he does not mention in his text its distinctive feature, the circular groove. Hence there is a doubt whether he had this plant or the preceding. Fries, as previously stated, confused this plant with three others under the name Geaster striatus. Berkeley (Eng. Flo. p. 301) apparently drawing his conclusions from Fries, applied the name G. striatus to the preceding plant and renamed this G. Bryantii, citing the same references for it that De Candolle had cited for striatus with the addition of one citation, (Schmidel, t. 37, f. 11, 12). The last citation is an error, Berkeley having confused a ring shown on the pedicel of the cut, in reality a remnant of the fleshy layer, with the groove that this plant properly has. Berkeley's idea of a distinctive groove, the essential feature, is the first clear conception of the plant and we adopt his name, there never having been any confusion about it. The name Geaster striatus which priorists will no doubt use, is subject to the objection in our mind of not having been clearly defined in the first place, and having been applied since to *six different plants* by six different authors. Our specimens show another difference between this plant and pectinatus. The peridium is lead color, due to a kind of pruinose covering which may be rubbed off, and usually is on the exposed parts, giving the peridium a variegated appearance as shown in our photographs. (*)

Misconception as to the value of the fleshy layer is the source of at least two species based on this plant. Geaster orientalis (Grev. vol. 6, pl. 98, f. 12) is the plant with fleshy layer still remaining and forming "a tube in the shape of a ring at the base of the interior peridium." Geaster Kunzei (Winter in Rabenhorst's Flora) is the same plant, the fleshy layer having peeled off, hence "Stiel ohne basale Scheide." I judge from literature that the species is more common than pectinatus, yet it has reached me more rarely and fewer specimens.

Specimens in our Collection.

Maine, H. C. Beardslee. *Texas,* W. H. Long, (specimen from C. L. Shear.) *England,* E. M. Holmes, Chas. Crossland. *Sweden,* L. Romell.

Explanation of Figures.

Specimens from: Fig. 23, H. C. Beardslee, (from Maine). Fig. 24, L. Romell, Sweden. Fig. 25, Chas. Crossland, England. Fig. 26, E. M. Holmes, England.

(*) The student will note that this is exactly the reverse of statement made by Massee on same subject.

7—GEASTER SCHMIDELII.

Exoperidium revolute, cut to about the middle to usually five to seven segments. Mycelial layer usually adnate. Fleshy layer thin, usually adnate. Inner peridium with a short thick stipe or subsessile. Mouth conical, sulcate. Columella large, ovate. Spores small, globose, minutely roughened, 3½–5 mc.

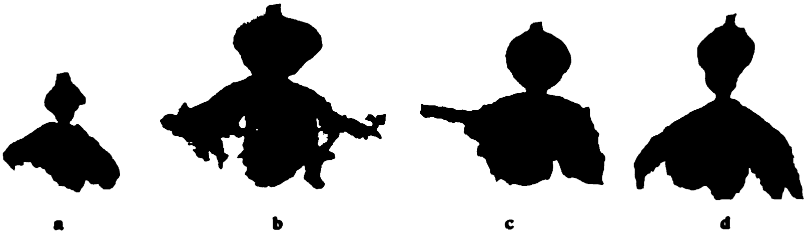

Fig. 27. Geaster Schmidelii.

This little plant is characterized by its small size, and short, thick pedicel. It is probably the plant covered in the text of Fries' Geaster striatus, but not his citations. It is the plant we think Chevallier intended to represent as G. minimus. (*) We have adopted the name used in the first illustration (Vittadini) that represents accurately this plant, though a large one, and although Vittadini's citations cover other species. The plant seems to be rare and has reached me but rarely.

Specimens in our Collection.

Tirol, Rev. G. Bresadola. *Hungary*, Dr. L. Hollos.

New Hampshire, C. E. Montgomery. (We have seen specimens also from *Vermont* in collection of A. E. Burt, and from *New Jersey* (unlabeled) in collection of N. Y. Bot. Gardens.

Explanation of Figures.

Specimens from: Fig. 27a, J. B. Ellis, New Jersey; b and c, C. E. Montgomery, New Hampshire; d, L. Hollos, Hungary.

8—GEASTER ASPER.

Exoperidium revolute, cut to about the middle to eight to ten segments. Both mycelial and fleshy layers are more closely adherent than in most species. Pedicel *short, thick.* Inner peridium subglobose, *verrucose.* Mouth conical, beaked, strongly sulcate, seated on a depressed zone. Columella prominent, persistent. Capillitium threads simple, long tapering. Spores globose, rough, 6 mc.

The character of this plant is the verrucose inner peridium. Under a glass of low power it appears as though the peridium was densely covered with grains of sharp sand. This plant alone has this character to our knowledge, and although it is indicated in the figures of G. coronatus of both Schaeffer and Schmidel, we think there it is an exaggeration of the very *minute* granular appearance coronatus has.

(*) Hollos refers this figure to Geaster asper.

Geaster asper is on the plate of the first Geasters figured (Michelius, 1729, pl. 100, f. 2), where the plant is characteristically shown, excepting the pedicel is more slender than normal. The word "asper" is the first descriptive adjective applied by Michelius. Fries included it in his complex striatus. It has been described as a new species in recent times by three authors; as G. campestris by Morgan (1887); as G. Berkeleyi by Massee (1889); and as G. pseudomammosus by Henning in 1900.

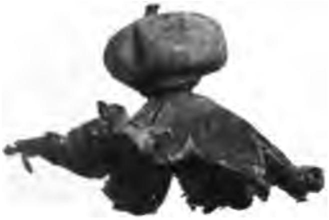

Fig. 28. Geaster asper.

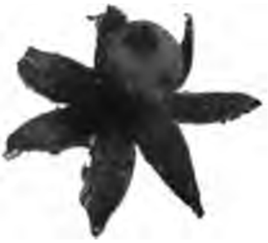

Fig. 29. Geaster asper.

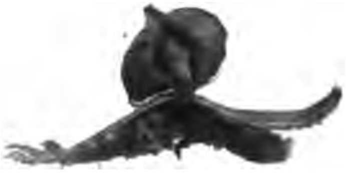

Fig. 30. Geaster asper.

Specimens in our Collection.

Hungary, Dr. L. Hollos.

Kansas, E. Bartholomew. *Kentucky*, C. G. Lloyd. *Ohio*, A. P. Morgan, (type specimens of G. campestris).

Explanation of Figures.

Figs. 28, 29 and 30 (section). Specimens all from A. P. Morgan, Ohio, and the type of "G. campestris."

9—GEASTER MORGANII.

Young plant acute. Exoperidium cut beyond the middle to seven to nine *acute* segments. In herbarium specimens usually saccate but sometimes revolute. Mycelial layer closely adherent, compared to previous species relatively smooth. (*) Fleshy layer when dry, thin closely adherent. Endoperidium globose, *sessile*. Mouth sulcate, indefinite. Columella globose-clavate. Capillitium thicker than the spores. Spores small, globose, 4 mc, almost smooth.

This plant is common around Cincinnati and was referred by Morgan to "striatus." It is a reddish brown plant and differs widely from other species with sulcate mouths previously described in its

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(*) As in the previous species the mycelium covers the young plant but is not so strongly developed so that the adhering dirt is not so evident on the mature plant.

closely sessile endoperidium. It is the same plant as lageniformis, indeed Bresadola so refers it, excepting that plant normally has an even mouth, and no other species to our knowledge has mouths in both the

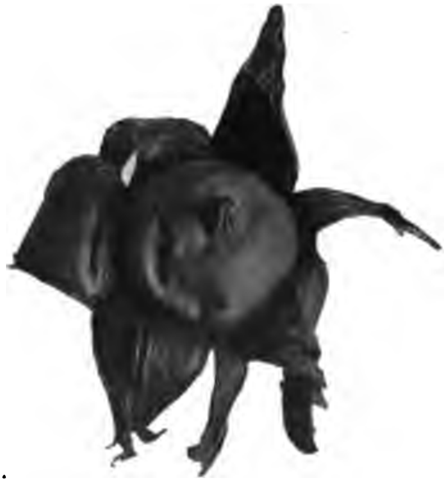
Fig. 31. Geaster Morganii.

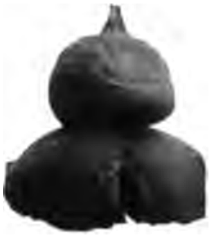
Fig. 32. Geaster Morganii.

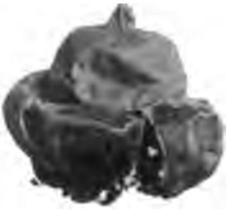
Fig. 33. Geaster Morganii

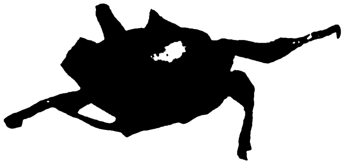
Fig. 34. Geaster Morganii.

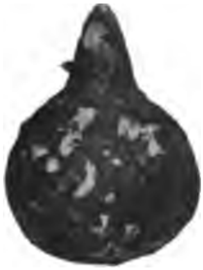
Fig. 35. Geaster Morganii.
(A young plant.)

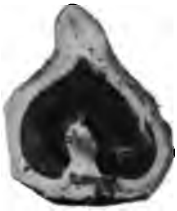
Fig. 36 Geaster Morganii.
(Section of a young plant.)

even and the sulcate series. Still we are convinced of the strong probability of this view and have found in a collection of sulcate mouthed specimens *a single specimen with an even mouth.* It is quite common in this immediate vicinity growing about old stumps and logs, but has never reached me from any other locality in this country or from Europe.

Specimens in our Collection.

Ohio, Mr. Spurlock, W. H. Aiken, C. G. Lloyd.

Explanation of Figures.

Figs. 31, 32 and 33. Specimens from Mr. Spurlock. Figs. 34, 35 and 36. Collected by author; all from immediate vicinity of Cincinnati. Figs. 35 and 36 from fresh specimens, others from dried specimens.

10—GEASTER SMITHII.

Young plant globose. Exoperidium subhygroscopic, cut about half way to 8 to 12 segments, partly reflexed but tips of segments drying incurved. Mycelial layer thin, usually adnate, with adhering sand. Fleshy layer drying thin, adnate. Inner peridium subpedicellate, in reality almost sessile but the outer peridium drawing away from it. Mouth *flattened conical* (or when old conical) *seated on a depressed area, regularly sulcate–striate.* Color of spore mass blacker than in most Geasters. Threads about thickness of spores. Spores globose, rough, apiculate, 4–5 mc.

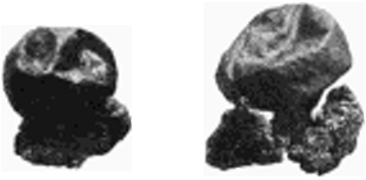

Fig. 37. Geaster Smithii.

This little plant is unique as to its mouth (well shown in our figures) from all other species. Morgan refers it to G. umbilicatus of Fries, and if we draw our conclusions only from what is published we should so refer it. Both Patouillard and Bresadola however, say "not umbilicatus" (*) and they are in better position to know than we are.

This plant was well described and figured by W. G. Smith (in Gard. Chron. 1873, p. 469) under the erroneous name of G. striatus. The figures have the mouth more protruding than our cut, but that is a condition of age. His figures show the same *depressed* area characteristic of the plant. He states "the striae of the mouth are so matchlessly perfect and beautiful that no art can do them justice." We believe however, our figure will give a good idea of them.

Being unable to call this plant umbilicatus (as did Morgan) or striatus (as did Smith) we have named it in honor of Worthington G. Smith, who has done better work with Geasters of England than any other mycologist.

Specimens in our Collection.

Florida, Mrs. Delia Sams.

Explanation of Figures.

Fig. 37. Specimens from Mrs. Delia Sams, Florida.

(*) "Not umbilicatus but a species unknown to me perhaps new."—Bresadola.

"Geaster umbilicatus of modern authors, but I am not certain that it is that species of Fries, and in any case it is *not* that of Montagne, neither of Léveillé "—Patouillard.

SPECIES WITH EVEN MOUTHS.—NON-RIGIDAE.

(See remarks on page 14 under head of "Species with sulcate mouths.")
The even-mouthed species can be divided into three subsections:

- Exoperidium recurved (not fornicate), (see following).
- Exoperidium fornicate,* (mostly quadrifid), (see p. 29).
- Exoperidium saccate, sessile, (see p. 33).

EXOPERIDIUM RECURVED, (not fornicate.) NON-RIGIDAE, MOUTH EVEN.

The mycelial layer in this subsection is often disposed to separate either entirely or partly adherent (particularly in limbatus and minimus) but is never truly fornicate as in the following subsection.

KEY TO THE SPECIES.

Large species,		
Unexpanded plant globose,		
reddish brown, sessile or pedunculate,......	(11)	rufescens.
black, pedunculate,................................	(12)	limbatus.
Unexpanded plant acute, plant reddish brown, ...	(13)	triplex.
Small species,		
pedicellate, not hygroscopic, ...	(14)	minimus.
subsessile, subhygroscopic,....................	(15)	arenarius.

11—GEASTER RUFESCENS

Unexpanded plant globose. Exoperidium recurved, cut to usually eight segments to about the middle. Mycelial layer, adnate with its adhering dirt or sometimes entirely peeled off. Fleshy layer mostly adnate, *thick*, porous, cracked and having the appearance of rough reddish leather. Inner peridium sessile or usually with a short thick pedicel, somewhat tapering toward the base. Mouth in-

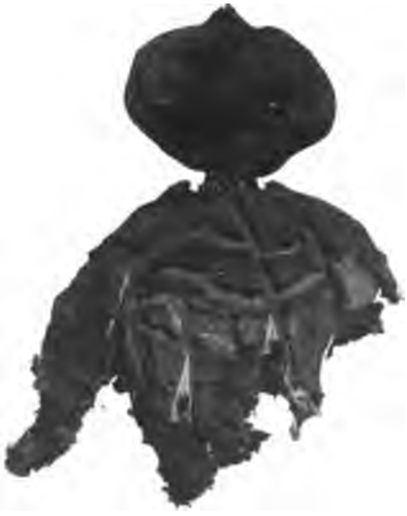

Fig. 38. Geaster rufescens.

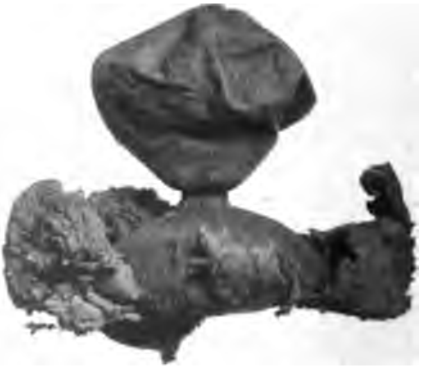

Fig. 39. Geaster rufescens.

(*) The word fornicate meaning arched, as applied to a Geaster means *arched over the cup shape mycelial layer.*

definite, fibrillose, frequently torn. (*) Columella large, thick, globose, permanent. Threads thicker than spores. Spores globose, roughened, varying from three to six mc.

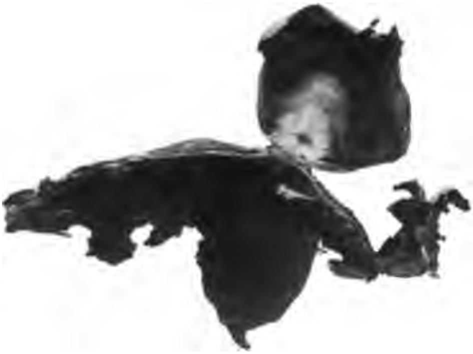
Fig. 40. Geaster rufescens (section).

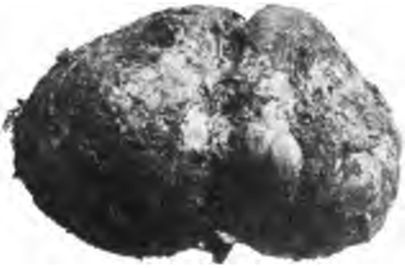
Fig. 41 Geaster rufescens (unexpanded plant.)

This is the large reddish plant, the most frequent species we have in this country. It is sometimes sessile but usually has a short thick peduncle. The plant from the days of Persoon has been placed in the "sessile" section of the genus, hence when Morgan met the peduncled form he naturally referred it to limbatus. Rufescens is a reddish brown plant, limbatus is a black plant, otherwise they are very close, though limbatus has usually a longer peduncle and a different shaped inner peridium. Schaeffer's old figure of the plant shows a regularly toothed mouth and Fries no doubt basing his description largely on this figure, described it as having a toothed mouth. The mouth is often torn but no more frequently than any other species, and the idea that this species can be distinguished by its "dentate peristome" is entirely erroneous, and should be dropped from descriptions.

Specimens in our Collection.

Ohio, A. P. Morgan, (labeled limbatus), David L. James, Tom Bell, H. L. True, E. J. Arrick, Tom Lloyd, C. G. Lloyd. *New York*, Ida M. Hays. *Kentucky*, Sister Marie. *Canada*, John Dearness, (spec. tending toward limbatus.)

Sweden. L. Romell. *England*, Carleton Rea. *Hungary*, Dr. L. Hollos. *Tirol*, Rev. G. Bresadola.

Explanation of Figures.

Fig. 38. Specimens from A. P. Morgan, Ohio. Fig. 39. Specimens from David L. James, Ohio. Fig. 40. Section, showing large columella. Fig. 41. Unexpanded plant, specimen from Dr. H. L. True, Ohio.

12—GEASTER LIMBATUS.

Outer peridium recurved, cut to about the middle to eight to twelve segments. Mycelial layer usually adnate with its adhering dirt, often partially separate, and sometimes entirely peeled off. Fleshy layer drying firm, hard, and closely adnate. Inner peridium some-

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(*) Hence often inaccurately described as "toothed."

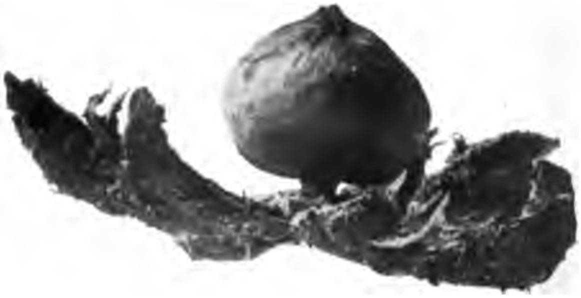

Fig. 42. Geaster limbatus

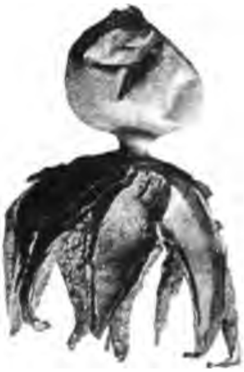

Fig. 43. Geaster limbatus.

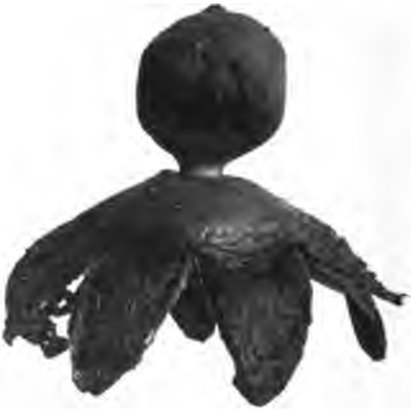

Fig. 44. Geaster limbatus.

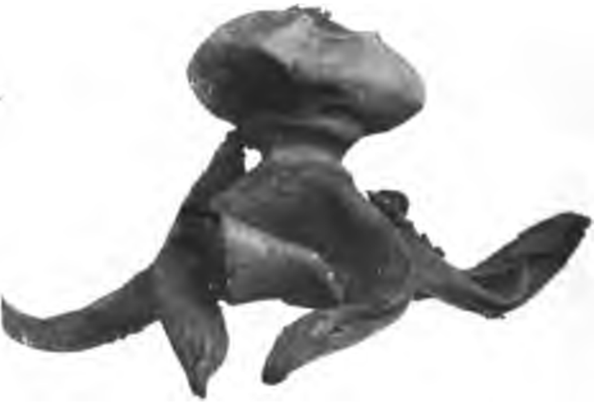

Fig. 45. Geaster limbatus.

times globose rounded at the base (Fig. 42) but usually "slightly constricted and then swollen at the base." (Fig. 45). Pedicel usually distinct—cylindrical (Fig. 43) but sometimes very short and thick, (Fig. 45). Mouth indefinite, fibrillose. Columella indistinct (in ripe specimens at least). Threads thicker than spores. Spores globose, roughened, 4–5 mc.

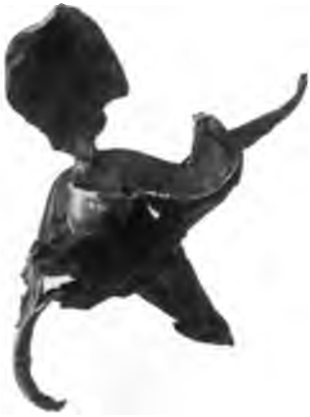
Fig. 46. Geaster limbatus (section)

Geaster limbatus is very close to G. rufescens, a fact that seems to have been noted by only one author, Scherffel. (*) The writers who usually place G. rufescens in the "sessile" section do not realize that it is so close to limbatus that specimens occur that are hard to refer to either species. G. rufescens is a reddish brown plant. G. limbatus is a black plant but the color distinctions run into each other to an extent. We have never seen G. limbatus with the thick porous fleshy layer, usually found on rufescens, and we have never seen rufescens with the peculiar constricted inner peridium usually (not always) found on limbatus. We believe that the prominent, persistent columella of rufescens is the characteristic feature which distinguishes it from G. limbatus. Any one knowing only extreme forms of limbatus such as Fig. 42, from England, and Fig. 45, from Kansas, would be justified in calling them different plants, but our series of specimens shows all grades of connecting forms.

G. limbatus is a frequent plant in this country and in Europe.

Specimens in our Collection.

Kansas, E. Bartholomew. *Iowa*, T. H. McBride. *Wisconsin*, Steve C. Stuntz. *Massachusetts*, F. Le Roy Sargent.

England, Carleton Rea. *Tirol*, Rev. G. Bresadola. *Hungary*, Dr. L. Hollos.

Explanation of Figures.

Fig. 42. Specimen from Carleton Rea. England. Fig. 43. Specimen from Steve C. Stuntz, Wisconsin. Fig. 44. Specimen from Dr. L. Hollos, Hungary. Fig. 45. Specimen from E. Bartholomew, Kansas. Fig 46. Section showing indistinct columella.

13—GEASTER TRIPLEX.

Unexpanded plant acute. Exoperidium recurved (or when not fully expanded somewhat saccate at base), cut to the middle or usually two-thirds to five to eight segments. Mycelial layer adnate. Fleshy layer generally peeling off from the segments of the fibrillose layer but usually remaining partially free as a cup at base of inner peridium. Inner peridium subglobose, *closely sessile*. Mouth *definite*, fibrillose, broadly conical. Columella prominent, persistent, elongated (see Fig. 49). Threads thicker than spores. Spores globose, roughened, 3–6 mc.

(*) "Geaster limbatus steht dem G. rufescens ungemein nahe."

Geaster triplex is a reddish brown color the same as G. rufescens with which we think it has been much confused though in reality a very different plant. It is not recorded from England (to our knowledge) and we think English botanists have mistaken it for rufescens. As the early figures on which rufescens is based show neither of the characters by which that plant is distinguished from triplex, it is doubtful if the latter plant is not really the original rufescens. The two plants were confused evidently by all the early botanists. The character generally given to distinguish triplex, viz: — the remains of the fleshy layer forming a cup at base of inner peridium while usually present should be considered in the nature of an accidental feature and not an essential character of the plant. It is however, the feature from which the plant derives its name, viz:—triplex, three fold, three layers. The distinguishing features by which the plant can be known from rufescens are, the acute (not globose) young form, the definite mouth, and shape of the columella (see Figs 40 and 49.)

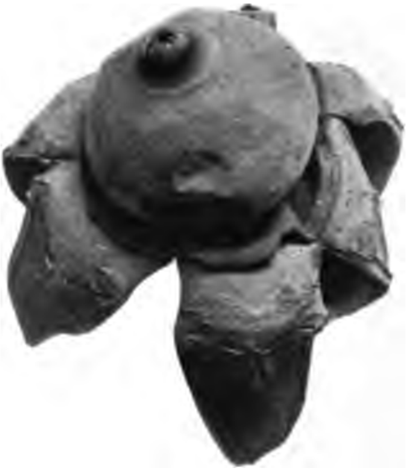

Fig. 47. Geaster triplex.

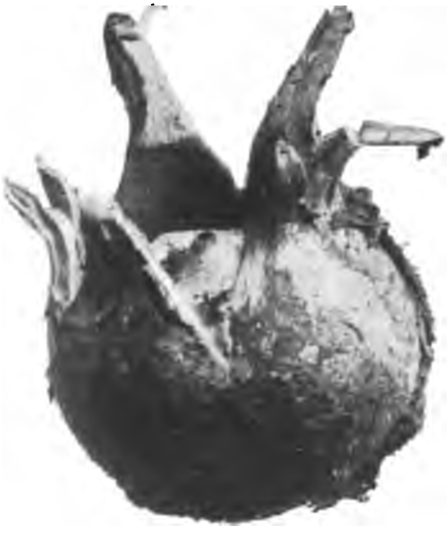

Fig. 48. Geaster triplex.
(Beginning to expand.)

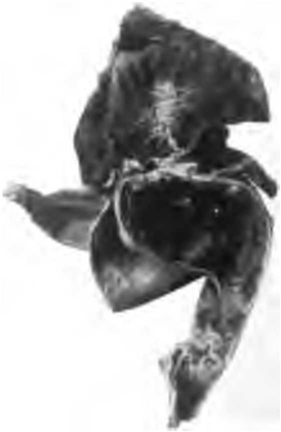

Fig. 49. Geaster triplex.
(Section.)

Geaster triplex seems to be frequent both in this country and in Europe, though we have no specimens from Europe.

Specimens in our Collection.

Canada; J. Dearness. *Minnesota,* Minn. Bot. Survey. *Ohio,* A. P. Morgan. *Pennsylvania,* Caroline A. Burgin. *Massachusetts,* G. E. Morris. *Connecticut,* E. P. Ely.

Explanation of Figures.

Fig. 47. A typically expanded plant, showing the remains of the fleshy layer from which the plant received its name, specimen from A. P. Morgan, Ohio. Fig. 48. A fresh plant beginning to expand, specimen from E. P. Ely, Connecticut. Fig. 49. Section showing columella.

14—GEASTER MINIMUS.

Exoperidium recurved, cut to about the middle to eight to twelve segments. • Mycelial layer usually adnate, usually shaggy with adhering fragments of leaves, etc., sometimes partly or entirely separating.

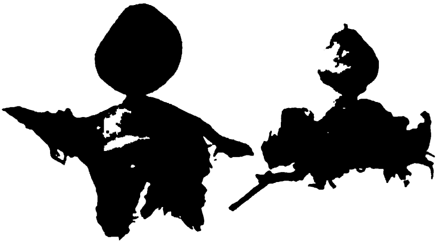

Fig. 50. Geaster minimus.

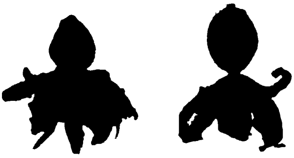

Fig. 51. Geaster minimus.

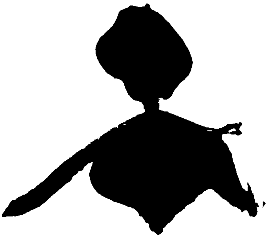

Fig. 52. Geaster minimus (section).

Fleshy layer closely adnate, very light color, usually smooth on the limb of the exoperidium but rimose on the segments. Pedicel short but distinct. Inner peridium subglobose or tapering to base, covered *with minute granules,* usually light colored, but sometimes almost black. Mouth definite, with well marked circular area. Columella slender. Threads slender, equal or thinner than the spores. Spores about 5 mc.

This little plant is the most common small species of Geaster we have in this country. It seems to be rarer in Europe where it is usually known as G. marginatus. Vittadini's cut accurately represents our plant and the identity of the European plant is well established. There is an earlier G. minimus of Chevallier but his figure is doubtful and even if it could be positively identified, it would not be advisable to replace the name so firmly established for the common American plant.

While the specimens in Schweinitz herbarium are normal, he described the plant as having a flattened base, "basi plano."

Morgan reconstructs a cut (Am. Nat. 1884, p. 967) based on this error.

Specimens in our Collection.

Florida, H. C. Culbertson, C. G. Lloyd. *Louisiana*, W. N. Clute. *North Carolina*, Hannah C. Anderson. *South Carolina*, P. H. Rolfs. *Ohio*, W. H. Aiken. *Pennsylvania*, Caroline A. Burgin, Dr. Wm. Herbst. *Michigan*, B. O. Longyear. *Iowa*, T. H. McBride. *Canada*, John Dearness.

France, E. Boudier. *Tirol*, Rev. G. Bresadola.

Explanation of Figures.

Fig. 50. Specimens from W. H. Aiken, Ohio. Fig. 51. Specimens from Dr. Wm. Herbst, Pennsylvania. Fig. 51. Section.

15—GEASTER ARENARIUS.

Exoperidium subhygroscopic, cut to five to ten segments; drying usually with segments incurved. Mycelial layer closely adnate with adhering sand. (*) Fleshy layer closely adnate, light color, not rimose. Inner peridium subglobose, with a very short but distinct pedicel in some specimens, in others appearing sessile. Mouth even, conical, acute, definite and usually darker colored than remainder of inner peridium. Columella indistinct. Spores globose, rough, 3–4 mc.

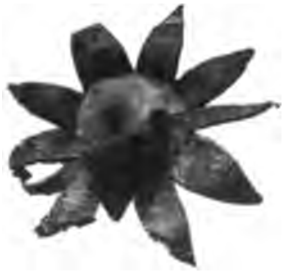
Fig. 53. Geaster arenarius.

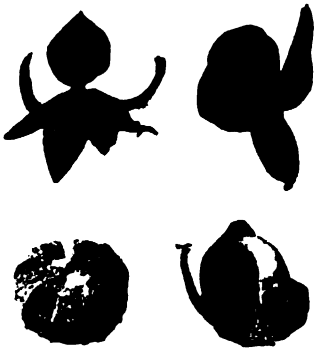
Fig. 54. Geaster arenarius.

This little plant which I collected Feb. 1895, in the sand at Jupiter, Florida, I have never succeeded in getting named. My correspondents have suggested "G. saccatus" and "G. floriformis," but I am sure it is neither of these. It is very close to minimus, differing in its shorter pedicel and more hygroscopic exoperidium. It is still closer to Smithii, excepting its mouth.

Specimens in our Collection.

Florida, H. C. Culbertson, C. G. Lloyd, (both from the sand at Jupiter, Florida.)

Explanation of Figures.

All specimens from Jupiter, Florida. The segments of the one closed are more strongly incurved than usual.

(*) One specimen alone we have with the mycelial layer peeled away except at the tips, showing its relation to the fornicate section.

EXOPERIDIUM FORNICATE.—NON-RIGIDAE, MOUTH EVEN.

The word fornicate means arched but as applied to a Geaster means *arched over the mycelial layer which separates and remains as a cup in the ground.* The first two species are thus strongly characterized, the third not to such a strong extent.

KEY TO SPECIES.

Mouth indeterminate, plant not rooting,	(16)	fornicatus.
Mouth indeterminate, plant strongly rooting,	(17)	radicans.
Mouth determinate, plant small,	(18)	coronatus.

16—GEASTER FORNICATUS.

Outer peridium strongly and typically fornicate, the mycelial layer forming a perfect cup at base of plant. Fibrillose layer arched above the cup, to which it is attached by the tips of the segments, cut into four (rarely five) long segments. Fleshy layer partly adherent. Inner peridium distinctly urn shape as shown in our figures (not globose as Massee depicts) tapering below into a short thick peduncle. Mouth indefinite. Columella. (*) Spores globose, almost smooth, 4 mc.

While the very early botanists (Persoon and Buxbaum) distinguished the plant from coronatus, as varieties of same plant, from the day when Fries made his confusing compilation (1829) up to last year, these two plants, so widely different (see figs. 56 and 61) that even the crude cuts are readily distinguished, have been confused by authors in general under the name "fornicatus." We have concluded to retain it (†) for this plant for two reasons. 1st, Hudson who first gave the name to a species of Geaster while confusing as to his citations, evidently knew only this plant, as evidence all tends to the fact that the other (coronatus) probably does *not occur in England.* Every English illustration, Bryant, Blackstone, Sowerby, Smith, Massee,) represents this plant It is the only one we have received from England and English botanists advise us it is the only one they know. 2nd, The idea of a "fornicate" species is so strongly connected with the genus Geaster that it should be perpetuated in nomenclature, and applied to the plant that typically represents the idea. This plant which grows only in deciduous woods is much rarer in continental Europe than coronatus that grows common in pine woods, hence the latter plant is the usual species that has been distributed in exsiccatae under the name "fornicatus" These two plants are so distinct that it is strange to us how they could ever have been considered

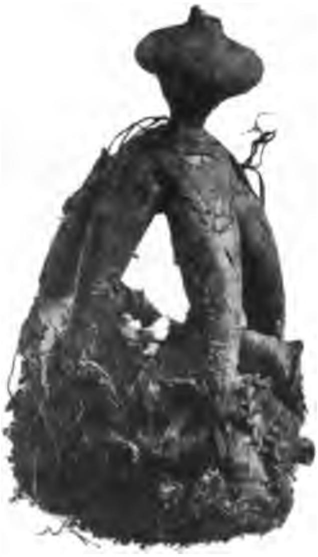

Fig. 55. Geaster fornicatus.

(*) We do not wish to mutilate by cutting the few specimens we have of this plant.
(†) This is a reversal of our decision last year (see Myc. Notes, p. 71).

varieties of the same plant much less confused under the same name. Fries not content by including in "fornicatus" two distinct species, further adds to the confusion by ascribing to it a sulcate mouth, a character which neither plant has. We do not think that Geaster fornicatus has ever been found in this country, and Geaster coronatus but rarely. The specimen preserved in the Schweinitz herbarium is neither of these species. (*) We do not know what it is.

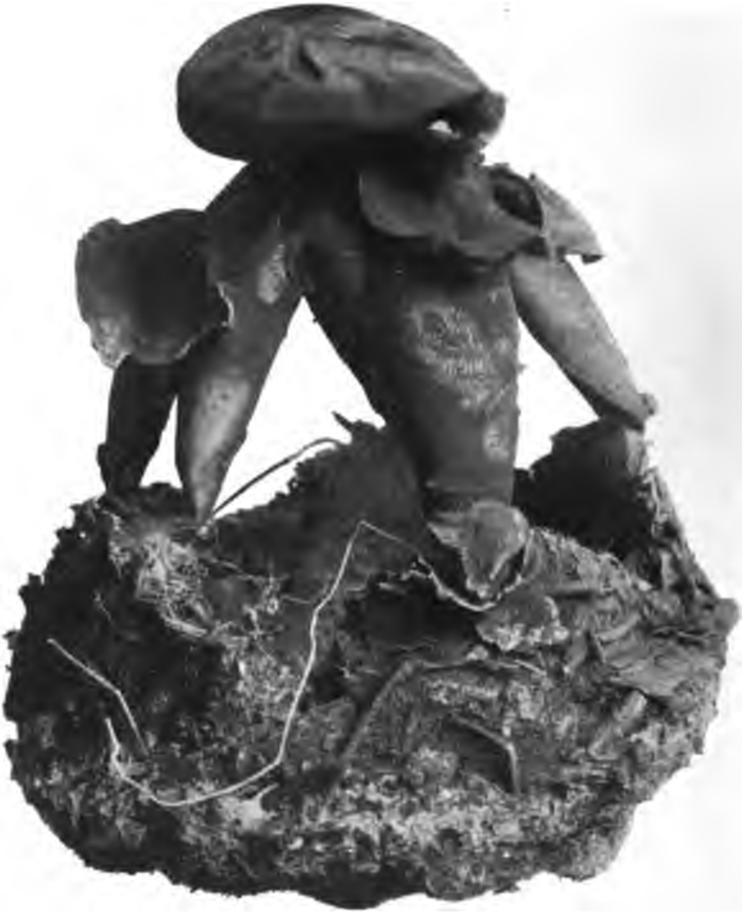

Fig 56 Geaster fornicatus.

Specimens in our Collection.

Hungary, Dr. L. Hollos. *England*, Carleton Rea.

Explanation of Figures.

Fig. 55. Specimen from Dr. L. Hollos, Hungary.
Fig. 56. Specimen from Carleton Rea, England.

(*) We state (Myc Notes, p. 77) that this is probably radicans, but a re-examination since of the specimen convinces us that it is not.

17—GEASTER RADICANS

Exoperidium typically fornicate, the outer layer separating and remaining as cup at the base, not having mycelium except at the base where it is strongly developed in a cluster of root-like fibers. Fibrillose layer arched, cut to five (or usually four probably) segments. Fleshy layer thin, dark reddish, closely adherent. Inner peridium subglobose but tapering to the base Mouth indefinite. Spores globose, almost smooth, 4 mc.

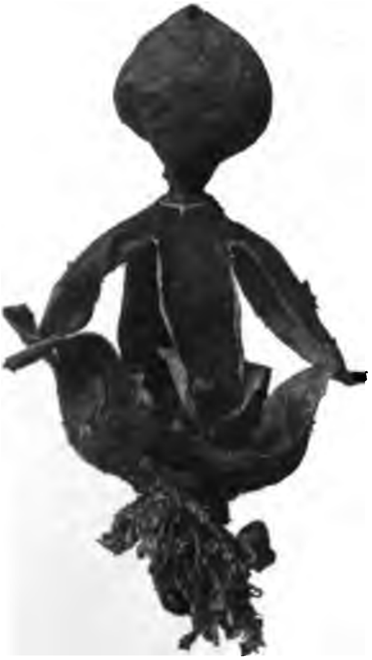

Fig. 57. Geaster radicans.

This plant related to fornicatus, is strongly different in the basal mycelium, and in the cup having lobes. It enjoys the unique distinction of being the only American species that has never been claimed by any one to grow in Europe. The only specimens we have seen are Rav. exsic. No. 103, and in the collection of Division of Veg. Pathology of Washington, where it was labeled "fornicatus." It grew on "a cedar log in Florida," but the collector's name not preserved. All its recorded stations are Southern and we believe it does not grow in our Northern States.

Specimens in our Collection.

Florida, (Kindness of Mrs. Patterson from the Washington collection).

Explanation of Figures.

Fig. 57. Specimen as above.

18—GEASTER CORONATUS.

Exoperidium fornicate, the mycelial layer forming an imperfect cup to which the arched segments of the fibrillose layer are loosely attached at the tips. The cup is not perfect however, as in the two previous species, but the mycelium is so strongly developed that adhering dirt and pine-needles represent an irregular mass rather than a definite cup Segments of the arched fibrillose layer usually four, sometimes five, deeply cut, but relatively short as compared to the segments of fornicatus Fleshy layer light colored, partially adherent or sometimes entirely peeled off. Inner peridium oblong, tapering to a short pedicel at the base and to an acute mouth at the apex, *covered with minute granular particles*. Mouth definite. Spores globose, roughened, 4 mc.

It is not necessary to repeat here what we have said under fornicatus in regard to the confusion of these two plants. This plant is much closer to the minimus than to fornicatus. Indeed, its inner peridium is the same as minimus and specimens, as often found in collections devoid of the mycelial layer, might be referred to minimus if attention were not directed to its fewer and deeper lobes of the exoperidium. There is really no name in use that we can apply to this plant free from all objections. Both coronatus used by Schaeffer and Scopoli and quadrifidus by Persoon, include two plants in the citations. We have adopted the earlier name of Schaeffer because it is quite appropriate, (the plant is not inaptly compared to a crown) and there is no question as to Schaeffer's figure being intended to represent this plant. This species is very common in continental Europe and fre-

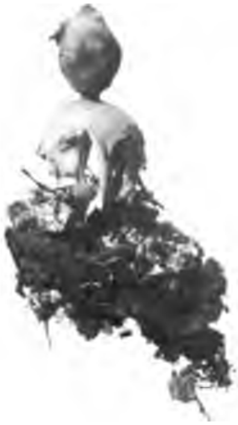

Fig. 58. Geaster coronatus.

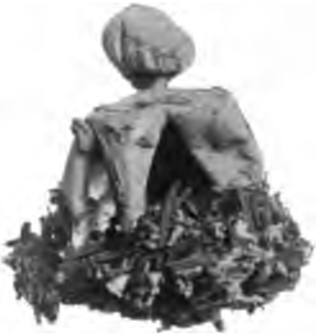

Fig. 59. Geaster coronatus.

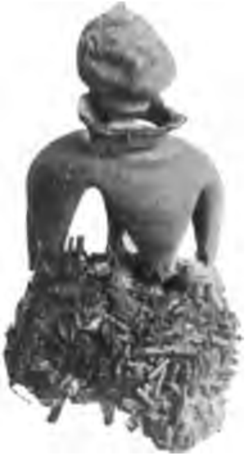

Fig. 60. Geaster coronatus.

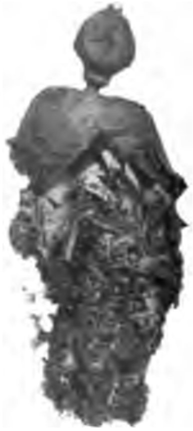

Fig. 61. Geaster coronatus.

quent in collections (usually under the name fornicatus). Romell writes me that it is the most common Geaster of Sweden and hence must have been known to Fries, though why he describes the mouth as "sulcate" is strange if he had observed the plant instead of Schaeffer's inaccurate figure. We have never seen but one collection of the plant from this country made by G. E. Morris, of Waltham, Mass

Specimens in our Collection.

Tirol, Rev. G. Bresadola. *Hungary*, Dr. L. Hollos. *France*, F. Fautrey. *Sweden*, L. Romell.
Massachusetts, G. E. Morris.

Explanation of Figures.

Fig. 58. Specimen from G. E. Morris, Massachusetts. Fig. 59. Specimen from F. Fautrey, France. Fig. 60. Specimen from Rev. G. Bresadola, Tirol. Fig. 61. Specimen from L. Romell, Sweden. The collar shown in this figure is an accidental remnant of the fleshy layer and might never occur in another specimen.

EXOPERIDIUM SACCATE.—MOUTH EVEN.

In all the previous species with even mouths the exoperidium when expanded is revolute away from the inner peridium, but in this subsection the base remains as a cup holding the inner peridium. We can readily conceive however, that this would not hold true in all cases, but it is the usual condition that we find in specimens. Fimbriatus of Europe while saccate in all our specimens is not put into the saccate section by Fries. Lageniformis while we have never seen specimens not saccate, we have of the closely related plant Morganii and conceive that if perfectly expanded this would become revolute (as Fig. 32). Velutinus and saccatus are however truly saccate species.

KEY TO SPECIES.

Unexpanded plant globose,
  Exoperidium splitting into two layers,
    velutinate, ...(19) velutinus.
    smooth, ...(20) fimbriatus.
  Exoperidium not separating, ...(21) saccatus.
Unexpanded plant acute, ...(22) lageniformis.

19—GEASTER VELUTINUS.

Unexpanded plants globose, sometimes slightly pointed at apex. *Mycelium basal.* Outer layer rigid, membranaceous, firm, light color in the American plant; dark, almost black in the Samoan. Surface covered with short, dense, appressed velumen in the American plant so short that to the eye the surface appears simply dull and rough, but its nature is readily seen under a glass of low power. In the Samoan plant the velumen is longer and plant appears to the eye as densely tomentose. The outer layer separates from the inner as the plant expands and in mature specimens is usually partly free. The thickness and texture of the two layers is about the same. Fleshy layer dark reddish brown when dry, a thin adnate layer. Inner peridium sessile, dark colored, subglobose with a broad base and pointed mouth. Mouth even, marked with a definite circular light-colored basal zone. Columella elongated, clavate. Spores globose, almost smooth, small, 2½–3½ mc.

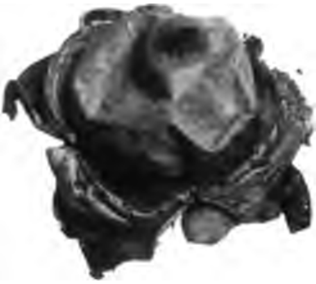

Fig. 62.

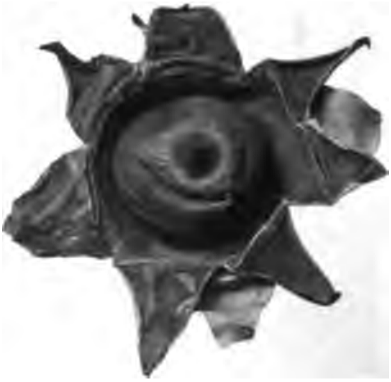

Fig. 63.

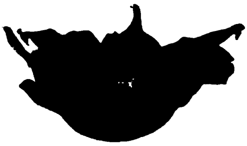

Fig. 64.

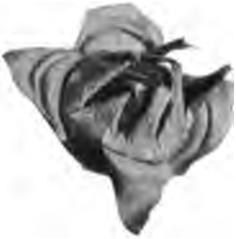

Fig. 65.

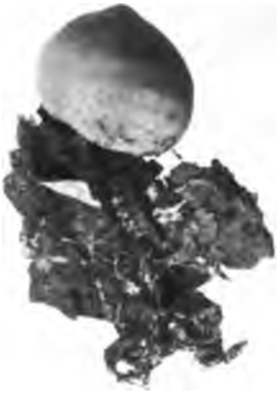

Fig. 69.

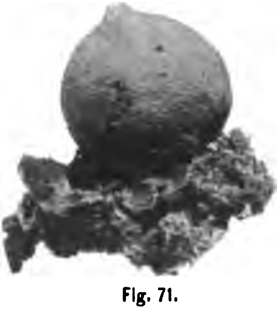

Fig. 71.

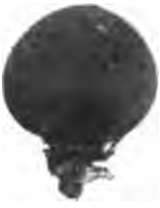

Fig. 68.

Fig. 70.

GEASTER VELUTINUS.

Explanation of Figures.

Figs. 62, 63 and 64. Expanded plant dried. Fig. 65. Just opening, showing the way two exoperidium layers separate. Figs. 66 and 67. Inner and outer view of a fresh expanded plant. Figs. 68, 69 and 71. Unexpanded plant. Fig. 70. Section of same.

Figs. 62, 63, 64 and 65. Specimens from Hugo Bilgram, Philadelphia. Figs. 66, 67 and 68. Photographs of fresh plants from Samoa. Figs. 69 and 70. From Cincinnati. Fig. 71. Specimen from A. P. Morgan and *type* of "Cycloderma Ohiensis."

This plant has a strange history. As far as we know it was first collected by Morgan in an unexpanded form and sent to Cooke, who hailed it with delight as a re-discovery of the long-lost genus "Cycloderma" (see Grevillea 1882, p. 95) and named it Cycloderma Ohiensis. We have "type specimens" of this plant given us by Morgan. We first collected it in the same condition and determined and distributed it as above. In 1898 Hugo Bilgram of Philadelphia, sent us a fine lot of a Geaster, new to us but mixed with a number of unexpanded specimens that we recognized as "Cycloderma Ohiensis." Comparison with "type" specimen leaves no question. When Morgan found the *expanded* plant he did not recognize the "Cycloderma Ohiensis" he had sent Cooke, but described as a new species Geaster velutinus. During a trip I made to Samoa (winter of 1899) I gathered a Geaster and sent it to Bresadola, which was described in Myc. Notes, p. 50, as "Geaster Lloydii." The plant was very dark colored, almost black, and densely velutinate, and the mouth is not definite, but a comparison of the specimens now with our American, leaves no doubt in my mind as to their being the same species. We are glad we are not priorists and therefore do not have to adopt the name "Geaster Ohiensis" for this plant, although we might write "Lloyd" after it; for "Ohiensis" was based on a mistake in the first place and is a local name not fitting to a plant that grows in Samoa.

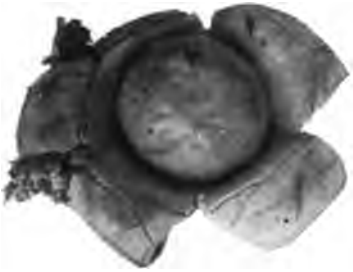

Fig. 66. Geaster velutinus.

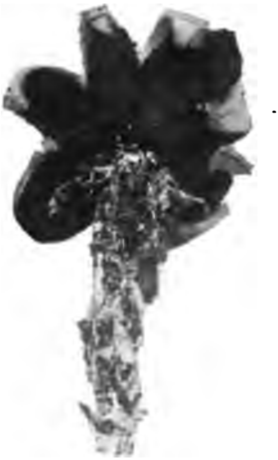

Fig. 67. Geaster velutinus.

Specimens in our Collection.

Canada, Wm. Dearness. *Pennsylvania*, Hugo Bilgram. *North Carolina*, H. C. Beardslee. *Ohio*, C. G. Lloyd, A. P. Morgan, (Type of Cycloderma Ohiensis) *Samoa*, C. G. Lloyd, (Type of Geaster Lloydii).

GEASTER VELUTINUS VAR. CAESPITOSUS.

A little plant growing densely caespitose, we collected and photographed at Crittenden, Ky. several years ago. We have lost our specimens but have no doubt it was but a small caespitose form of velutinus. The fresh plants were much darker color than the ordinary form, approximating in that respect the plants we collected in Samoa.

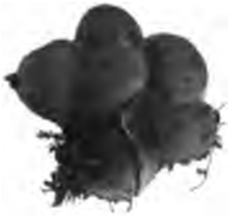

Fig. 72. Geaster velutinus var. caespitosus. (Unexpanded.)

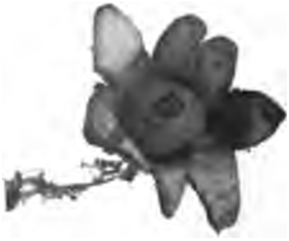

Fig. 73. Geaster velutinus var. caespitosus. (Expanded.)

Explanation of Figures.

Figs. 72 and 73. From fresh plants, Kentucky.

20—GEASTER FIMBRIATUS.

Mycelium universal. Exoperidium cut to six to eight segments about half way, the limb shallow saccate. (*) Outer layer membranaceous, usually separating partially from the inner, the two layers being very similar as to texture and thickness as in the preceding plant. Fleshy layer when dry, thin, adnate. Inner peridium sessile globose, with an indeterminate fibrillose mouth. Spores globose, almost smooth, 4 mc.

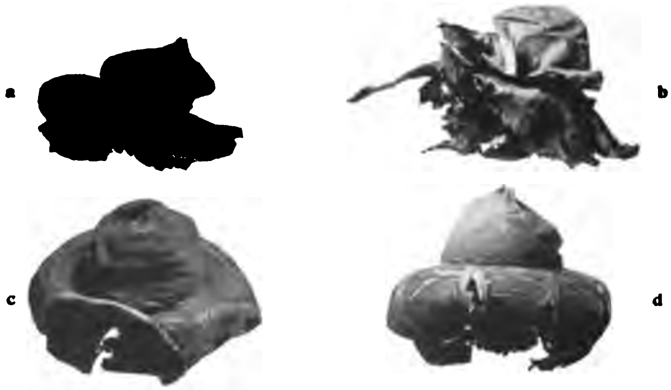

Fig. 74. Geaster fimbriatus.

(*) Fries who established the species did not describe it as saccate though if we can depend on the specimens we have, and the figure from Europe it belongs in this section.

This plant which I only know from European specimens I am convinced is practically the same plant as our saccatus. (*) With the exception of the indeterminate mouth, and the tendency of the exoperidium to split into two layers I can see no other difference. The idea that fimbriatus can be known by its "fimbriate" mouth is an error. The mouth does not differ from several other species with indeterminate mouths. The plant is recorded several times from this country, but I think determinations are based on saccatus.

Specimens in our Collection.

France, E. Boudier. *Hungary*, Dr. L. Hollos. *Tirol*, Rev. G. Bresadola.

Explanation of Figures.

Fig. 74a, c and d. ,Specimens from Dr. L. Hollos, Hungary.
Fig. 75b. From Rev. G. Bresadola, Tirol.

21—GEASTER SACCATUS.

Unexpanded plant globose. Mycelium universal. Exoperidium cut to six to twelve segments about half way, the limb deeply saccate. Mycelial layer adnate to fibrillose. Fleshy layer when dry, thin, adnate. Inner peridium sessile, globose, with a determinate fibrillose mouth. Spores globose, almost smooth, 4 mc.

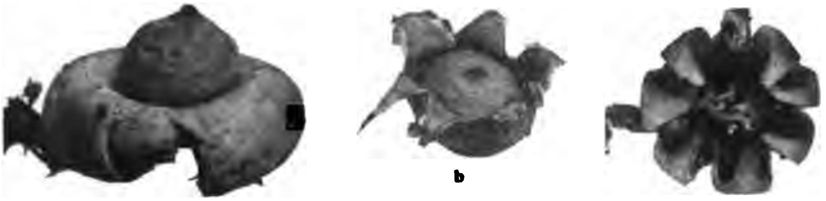

Fig. 75. Geaster saccatus.

Although the plant differs in being more deeply saccate and having a determinate mouth, I believe it is only the American expression of G. fimbriatus of Europe. It is a very common little plant in this section, growing gregarious over rich soil and decaying leaves in woods. Geaster saccatus is a name given to a South American plant by Fries and applied to our species by apparently universal consent. I do not know however, that anyone really knows that it is Fries' plant. It certainly is not the plant that Spegazzini distributed from South America as saccatus.

Specimens in our Collection.

Florida, Mrs. Delia Sams. *Missouri*, N. M. Glatfelter. *Minnesota*, Minn. Bot. Survey. *Illinois*, L. H. Watson. *Ohio*, A. D. Selby, W. H. Aiken. *Kentucky*, C. G. Lloyd. *Pennsylvania*, Ellen M. Dallas. *Mexico*, E. W. D. Holway.

Explanation of Figures.

Fig. 75a. Expanded plant from fresh specimens. Fig. 74b. From dried specimens. Fig. 75c. Reverse view of expanded specimen. All from collection of author.

(*) Bresadola says not.

22—GEASTER LAGENIFORMIS.

Unexpanded plant acute, ovate, (compared to shape of a flask). Mycelium mostly basal. Exoperidium usually saccate. (*) Mycelial layer generally closely adnate, sometimes disposed to separate, often split into parallel lines. (†) Fleshy layer thin, usually peeling off from the segments but remaining on the limb of the exoperidium. Endoperidium subglobose, closely sessile. Mouth conical, definite. (‡) Columella elongated, in dried ripe specimens somewhat subglobose. Spores globose, rough, 5–6 mc.

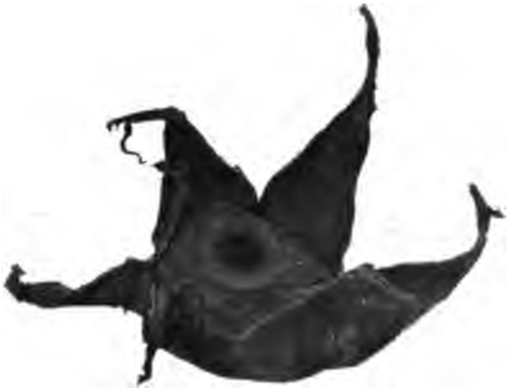

Fig. 76. Geaster lageniformis.

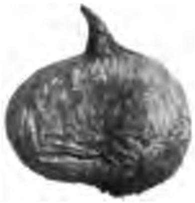

Fig. 77.
Geaster lageniformis.
(Unexpanded, dried.)

The entire plant is a reddish brown. Morgan (in conversation) suggests that it is a depauperate form of G. triplex, a view that is not improbable. The expanded plant can with difficulty be told from G. saccatus, though segments are more acute. The distinction is in the form of the unexpanded plant.

Specimens in our Collection.

Pennsylvania, Dr. Herbst. *Florida*, Mrs. Delia Sams. *Connecticut*, E. P. Ely. *Minnesota*, Minn. Bot. Survey. *Washington*, W. N. Suksdorf. *Germany*, P. Magnus.

Explanation of Figures.

Fig. 76. Expanded plant from dried specimens in N. Y. Bot. Garden.

Fig. 77. Unexpanded plant from Minn. Bot. Survey; the shape is no doubt more abruptly acute than the fresh plant would be.

(*) In all our specimens and in Vittadini's figure. Smith (Gard. Chronicle 1873, p. 608) shows it recurved and it probably is so in fully expanded fresh plants.

(†) Mentioned by Morgan as G. vittatus.

(‡) In some specimens the entire mouth is lighter color than remainder of endoperidium, in other the mouth is dark but has a light color basal line.

APPENDIX 1.

REFERENCES.

These references are to plants and not to authorities for names of plants. They represent our views of the classification of *plants*. We do not present reference to the ownership or authority for names, as many authors do. Thus our citation under Geaster asper of "Geaster granulosus Cragin in Bull. Washburn" does not indicate that Cragin named a plant "Geaster granulosus." Whether he did, or did not, is of no possible interest to anyone save possibly to Mr. Cragin. The fact however, that he recorded a plant as "Geaster granulosus" which plant is G. asper is of interest to every student of Geasters and these facts alone we have endeavored to cite.

We give the names applied to plants since the adoption of the binomial system, and the fact that the *same name* has been applied to so many *different plants* by various authors we think should impress upon the student the importance of turning his attention to the study of plants, rather than the study of names. Previous to the adoption of the binomial system, we have cited no "names" as we consider the polyglot adjectives applied by the pre-Linnaean botanists in the nature of descriptions rather than names. We have given a few references on the authority of Rev. Bresadola (kindly communicated to us in letters), and some on the published work of Dr. Hollos.

Except when stated however, these references represent our views. We have cited very few references save where the plant is illustrated, or where we have seen specimens. for the citations of many authors are so conflicting that it is impossible to state what *plant* they have in view. Where an author gives an illustration of a plant that can be recognized, we accept that figure as representing the plant he had, though it may be in direct conflict to citations that he has made. We have given no bibliography in explanation of these references, and refer those interested to the excellent bibliography of the Gastromycetes given by Massee in Vol. 4 of Annals of Botany.

We feel and hope that most of our readers will study the plants that they meet, and that few will care to puzzle over these references. Those however, who study names of plants, or rather, who study misnames of plants, should be prepared to interpret these references without the aid of a "bibliography."

MYRIOSTOMA COLIFORMIS.

Doody in Ray. Syn. 2nd Ed. App. p. 340,—*Lycoperdon coliforme*, Dickson Fasc. 1, t. 3, f. 4, (good); Sowerby t. 313 (fine); *Geastrum coliforme*, Pers. Syn. p. 131,—*Geaster coliformis*. Smith in Gard. Chron. 1873, p. 469, f. 86; (Reproduced Grev. Vol. 2, t. 15, fig. 1); Massee Monog. Brit. Gast. fig. 66; Fischer in Eng. & Prantl, p. 321, fig. A.

GEASTER ASPER.

Michelius t. 100, f. 2 (more distinctly pedicellate but quite characteristic); Gleditsch Meth. t. 6, (copied from Michelius).—*Lycoperdon stellatum*. Purton Midland Flora Vol. 3, t. 20, (a splendid figure and rarely cited).—*Geaster asper*, Myc. Notes, No. 151; Hollos Term. Füzetek, (1902) p. 120; *Geaster Berkeleyi*, Massee Mon. Brit. Gast. t. 2, f. 41 (poor);—*Geaster campestris*, Morgan's Flora, p 14; Ellis N. A. F. Exs. No. 1940; Hollos "Kül. a Term. Köz." p. 23, f. 9;—*Geaster granulosus*, Cragin Washburn Bull., p. 40;—*Geaster pseudomammosus*, Henning Hedw. Vol. 39, p. 54, (teste Hollos);—*Geaster pseudostriatus*, Hollos Math. Term. Ert. (1901), p. 505, (Specimen examined, see Appendix p. 43).

GEASTER BRYANTII.

Geaster Bryantii, Berk. Eng. Flo. p. 300; Mass. Mong. Brit. Gast. t. 4, f. 56; Smith Gard. Chron. 1873, p. 505, f. 94; Reproduced Grev. Vol. 2, t. 16, f. 2.—*Geastrum coronatum var. Woodwardii*, Pers. Syn. p. 132.—*Geaster calyculatus*, Fuckel Symbolae, t. 5, f. 3; Zopff & Sydow Exs. No. 6; Rabenhorst Exs No. 2639.—*Geaster Bryantii form a fallax*, Scherffel Ber. Deut. Bot. Ges. 1896, t. 19, f. 3 (only);—*Geaster Rabenhorstii*, Haszl. Grev. Vol. 6, t. 98, f. 11.—*Geaster Kunzei*, Winter

Rab. Flora, p. 911.—*Geaster orientalis*, Haszl. Grev. Vol. 6, t. 98, f. 12.—*Geaster fornicatus var. multifidus*, Karsten (Spec. in N. Y. Bot. Garden).—Greville states "It is well figured in new series of Flora Londinensis." I have found no other references to this figure.

GEASTER CORONATUS.

Schmidel, t. 37, f. 1 and 2, (mouth not good in either, but both evidently this plant); Buxbaum, t. 28, f. 2, (teste Hollos); *Geaster quadrifidum var. minus*. Pers. Syn., p. 133;—*Lycoperdon coronatum*, Schaeffer, t. 183, (figure inaccurate but evident);—*Geaster fornicatus*, Thümen Myc. Univ. Exs. No. 526; Zopff & Sydow, Myc. Marc. Exs. No. 53; Kunze Exs. No. 11; Rabenhorst Exs. No. 2013b; Krieger Fungi Sax. Exs. No. 272; Roumeguere Exs. No. 3635; Winter's Rab. Flora, p. 896, f. 5; Hahn Pilzsammler, t. 29, f. 156; Myc. Notes, No. 153.—*Geastrum quadrifidum*, Pers. Comm., p. 75; Nees Pilze, t. 12, f 128. (copied from Schmidel);—*Geaster quadrifidus var. minor*, Hollos Term. Füzetek, 1902, p. 116. (*)

GEASTER DELICATUS.

Geaster delicatus, Morgan's Flora, p. 17; Ellis' N. A. F. Exs. 2nd Series, No. 1941.

GEASTER DRUMMONDII.

Geaster Drummondii, Berk. in Hooker's Journal, 1845, t. 1, f. 4.—*Geaster striatulus*, Kalch. Grev. Vol. 9, p. 3; Myc. Notes, No. 152.—*Geaster Schweinfurthii*, Eng. Bot. Jahrb. Vol. 14, t. 6, f. 7, (fine);—*Geaster mammosus*, Ellis N. A. F. Exs. No. 110.

GEASTER FIMBRIATUS.

Geaster fimbriatus, Fries' Syst., p 16 (exc. cit.); Smith Gard. Chron., 1873, p. 543, f. 104; Reproduced Grev. Vol. 2, t. 17, f. 2; Roumeguere Exs. No. 510 and No. 2317; Thümen Myc. Univ. Exs. No. 411; Kunze Fung. Exs. No. 8; Desmazieres' Exs. No. 956; Rabenhorst's Exs. No. 2010b.

GEASTER FORNICATUS.

Battarrea Fung. t. 39, (characteristic): Buxbaum t. 28, f. 1 (teste Hollos). *Lycoperdon fornicatum*, Huds. Fl. Eng., p. 644; Sowerby t. 198, (fine, but segments of exoperidium not relatively long enough); Bryant f. 14-17 (teste Hollos).—*Geaster fornicatus*, Massee Mon. Brit. Gast. t. 2, f 42, (subject to same criticism as Sowerby's figure); Smith Gard. Chron., 1873, p. 469, f. 87; Reproduced Grev. Vol. 2, t. 15, f. 2.—*Lycoperdon fenestratum*, Batsch Elen. t. 29, f. 168 a. b. (teste Hollos).—*Geaster fenestratus*, Myc. Notes, No. 150.—*Geastrum quadrifidum var. fenestratum*, Pers. Syn., p. 133.—*Geaster quadrifidus var. major*, Hollos Term. Füzetek (1902) p. 116. (*)—*Geaster Marchicus*, Fischer in Eng. & Prantl, p. 321, fig. B.—*Pleostoma fornicatum*, Corda Icon. Vol. 5, t. 4, f. 43.—*Geaster MacOwani*, Kalch, in Grev. Vol. 10, p. 108.

GEASTER HYGROMETRICUS.

Schmidel t. 28; Michelius t. 100, f. 4, 5 and 6, (the last the best); Gleditsch Meth. t. 6, (copied from Michelius).—*Geastrum hygrometricum*, Pers. Syn. p. 135; Schweinitz Fung. Car. No. 329; Nees Pilze t. 12, f. 127, (copied from Schmidel).—*Geaster hygrometricus*, Fries Syst. p. 19; Smith Gard. Chron. 1873, p. 577, t. 112; Reproduced Grev. t. 13. f. 2; Trelease Trans. Wis. Acad. Vol. 7, t. 7, f. 1, (poor); Winter Rab. Flora, p. 895, f. 1-3;—*Geaster vulgaris*, Corda Icones, Vol. 5, t. 4, f. 42;—*Astraeus stellatus*, Fischer in Eng. & Prantl, p. 341, fig. A, B and C;—*Astraeus hygrometricus*, Morgan's Flora, p. 19;—*Geastrum fibrillosum*, Schweinitz Syn. Car. No. 330, (we have examined the specimen and it is unquestionably an o'd weather-worn specimen of hygrometricus).

(*) The names adopted by Hollos seem very strange in view of the statement in the text "These two fungi are *no varieties* but are two different, independent species."

GEASTER LAGENIFORMIS.

Boccone Mus. t. 301, f. 6; (section of young plant);—*Geaster lageniformis*, Vitt. Monog. Lyc. t. 1, f 2; Myc. Notes, No. 167;—*Geaster saccatus*, Morgan's Flora, p. 18 (exc. of illustration); Smith, Gard Chron. 1873, p. 1275, f. 266; Reproduced Grev. Vol. 2, t. 20, (We think the plant Smith took for lageniformis fig. 116, is a form of the plant but not so typically as the plant he called saccatus); Trelease Trans. Wis. Acad. Vol. 7, t. 7, f. 2.—*Geaster minutus*, Henning Hedw. Vol. 39, p. 54 (teste Hollos).

GEASTER LIMBATUS.

Schmidel t. 46, (mouths too strongly defined); Ray Syn. 3rd Ed. t 1, (poor);—*Lycoperdon stellatum*, Sowerby t. 312, (good); *Geaster limbatus*, Fries Syst. p. 15; Hussey Brit. Myc. t. 2, (splendid and shows both slender and thick peduncled forms); Zopff & Sydow Exs. No. 103; Myc. Notes, No. 154.—*Geastrum coronatum*, Pers. Syn. p. 132;—*Geastrum multifidum var. B*—"Pers. Disp. meth. p. 6"—*Geaster pseudolimbatus*, Hollos Math. Term. Ert. 1901, p. 507, (specimens examined, see Appendix p. 43).

GEASTER MAMMOSUS.

Michelius t. 100, f. 3;—*Geaster mammosus*, Chevallier Flo. Paris, p. 359; Morgan's Flora, p. 16; Smith Gard. Chron. 1873, p. 543, f. 105; Reproduced Grev. Vol. 2, t. 19, f. 1; Vitt. Monog. Lyc. t. 1, f. 9, (fine);—*Lycoperdon recolligens*, Sowerby, t. 401, (fine).—*Geaster hygrometricus*, Massee, Monog. Brit. Gast. t. 4, f. 70, (His text of hygrometricus is correct but his figure is that of mammosus);—*Geastrum hygrometricum var. anglicum*, Pers. Syn. p. 135.

GEASTER MINIMUS.

Geastrum minimum, Schweinitz Fung. Car. No. 327, (confirmed by examination of his specimen).—*Geaster minimus*, Fries' Syst. p. 16; Morgan's Flora, p. 15; Ravenel Car. Exs. No. 74; Ravenel Amer. Exs. No. 472; Ellis N. A. F. Exs. No. 109; Roumeguere Exs No. 4549; Thümen Myc. Univ. Exs. No. 13; Myc. Notes, No. 146.—*Geaster marginatus*, Vitt. Monog. Lyc. t. 1, f. 6, (a small but correct figure of the plant);—*Geaster granulosus*, Fuckel (teste Bresadola), "I have just examined original specimens of G. granulosus Fuck. and it is G. marginatus 'tout á fait.' -"Bresadola.—*Geaster Schmidelii*, Roumeguere Exs. No. 3828.—*Geaster Queletii*. Hazsl. (teste Bresadola in letter.)—*Geaster Cesatii*, Rabenhorst (teste Bresadola in letter.)

GEASTER MORGANII.

Geaster Morganii. Myc. Notes, No. 168.—*Geaster striatus*, Morgan's Flora, p. 17; Ellis' N. A. F. 2nd series, No. 2736.—*Geaster saccatus*, Morgan's Flora, Plate 1. f. C.

GEASTER PECTINATUS.

Schmidel t. 37, figs. 11, 12, 13, 14, (the "rings" shown in fig. 11 has caused this figure to be referred, (erroneously) to Bryantii);—*Geastrum pectinatum*, Pers. Syn., p. 132;—*Geastrum multifidum var. a*, "Pers. Disp. Meth. p. 6."—*Geaster limbatus*, Smith Gard. Chron. 1873, p. 504, f. 95; Reproduced Grev. Vol. 2, t. 17, f. 1.—*Geaster Schmidelii*, Massee Mon. Brit. Gast. t. 4, f. 74; Winter Rab. Flora, p. 910;—*Geaster Bryantii forma fallax*, Scherffel Ber. Deut. Bot. Ges. 1896, t. 19, f. 1, 2 and 4, (not 3); *Geaster tenuipes*, Myc. Notes, No. 155.

GEASTER RADICANS.

Geaster radicans, Ravenel Exs No. 103; Myc. Notes, No. 159.

GEASTER RUFESCENS.

Schmidel t. 43 (mycelial layer inaccurately shown; the "dentate" mouths of this figure are responsible for this erroneous idea in connection with the species). Schmidel t. 43 (cont. on t. 50).—*Geastrum rufescens*, "Pers. Disp. meth.

p. 6"; Pers. Comm. p. 74; Pers. Syst. p. 134; Schweinitz' Fung. Car. No. 328, (the specimen in his collection is typical but sessile).—*Geaster rufescens*, Fries' Syst. p. 18; Smith Gard. Chron. 1873, p. 577, f. 111, (Reproduced Grev. Vol. 2, t. 19, f. 2).—*Lycoperdon recolligens*, Sowerby t. 80, (Usually here referred but I think more probably fimbriatus).—*Lycoperdon stellatum*, Sowerby in index to same figure; Schaeffer t. 182, (mouth very poor).—*Lycoperdon sessile*, Sowerby in text under t. 401, (referring to fig. t. 80).—*Geaster multifidum*, Grev. Flo. t. 306, (the expanded plant has the fleshy layer gone and endoperidium distinctly peduncled, the unexpanded plant is *globose*).—*Geaster limbatus*, Morgan's Flora, p. 15, plate 1, f. B.; Ellis' N. A. F. Exs. No. 1309.—*Geaster mammosus*, Rabenhorst's Exs. No. 814.—*Geaster Schaefferi*, Vitt. Monog. Lyc. t. 1, f. 1, (a small plant).

GEASTER SACCATUS.

Geaster saccatus, Ellis & Ev. Fung. Col. Exs. No. 1217; Myc. Notes. No. 162.—*Geaster lageniformis*, Morgan's Flora, p. 19.—*Geaster capensis*, Thümen Myc. Univ. Exc. No. 715; Roumeguere Exs. No. 4548.

GEASTER SCHMIDELII.

Geaster Schmidelii, Vitt. Monog. Lyc. t. 1, f. 7.—*Geaster Rabenhorstii*, Trelease Trans. Wis. Acad. Vol 7, t. 7, f. 3; Kunze Exs No. 10; Rabenhorst Exs. No. 2011; Zopff & Sydow Exs. No. 7.—*Geaster striatus*, Peck's 38th Rep. p. 94, (teste Trelease).

GEASTER SMITHII.

Geaster striatus, Smith Gard. Chron. 1873, p. 469, f. 88. (Reproduced Grev. Vol. 2, t. 16, f. 1.)—*Geaster umbilicatus*, Morgan's Flora, p. 16, (exc. reference to Ellis' Exc).

GEASTER TRIPLEX.

Michelius t. 100, f. 1, (Fries refers this to fimbriatus, Smith to Michelianus).—*Geaster triplex*, Morgan's Flora, p. 18; Ellis N. A. F. Exs. No. 2735; Thümen Exs. No. 1410.—*Geaster cryptorhynchus*, Hazslinszky Grev. Vol. 3, p. 162, t. 47.—*Geaster Pellotii*, Rose (teste Bresadola).—"*Geaster stellatus Linn.*" Morgan in Jour. of Mycology, Vol. 8, p. 4. (*)

GEASTER VELUTINUS.

Geaster velutinus, Journ. Cin. Soc. Nat. Hist. Vol 18, p. 38; Cycloderma Ohiensis Grev. Vol. 11, p. 95.—*Geaster Lloydii*, Myc. Notes, No. 117.

(*) Linnaeus' idea of "Lycoperdon stellatum" was simply the genus Geaster as we now know it. He did not know any *species* of Geasters and referred to "Lycoperdon stellatum" every figure of a Geaster he found, some half dozen different species. It is absurd in our mind to attempt to replace an established name of a species of Geaster on the *authority of Linnaeus*, a man who had no idea of *any species* of Geaster. Michelius who wrote many years before Linnaeus, had definite ideas of a few Geasters, but Linnaeus did not know enough of the subject to avail himself of the work of Michelius Linnaeus apparently was not acquainted with the work of Schmidel, a pre-Linnaean botanist, who well illustrated several species.

APPENDIX 2.

SPECIMENS FROM DR. HOLLOS.

Since most of this pamphlet has been in type we have received from Dr. Hollos, Hungary, three specimens of Geasters.

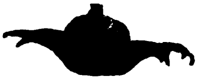

Fig. 78.

Fig. 78, a little plant which Dr. Hollos sends as G. floriformis of Vittadini and considers same as G. delicatus of Morgan. We consider both of these views probable but neither proven. If it is G. delicatus then our idea of mouth of G. delicatus is wrong, for Hollos' specimen has a distinct and protruding mouth as shown in our figure, and we have always supposed G. delicatus to have a mouth not protruding, being merely an aperture. It is possible that these views, drawn from all specimens we have seen are wrong and that the mouth of G. delicatus *when perfect is protruding* as shown in fig. 78. In two of Hollos' specimens the mouths were worn off and the specimens could well be taken for G. delicatus. Let us hope that Messrs. Bessey, Piper, and Suksdorf who collect this plant will notice this point particularly during the present season.

As to the plants being G. floriformis, they do not agree with Vittadini's figure in two particulars. They are depressed globose; Vittadini shows an elongated plant. Their mycelium is evidently universal; Vittadini shows the mycelium *basal*, though this to our mind is probably erroneous as we *doubt if any of the rigidae have basal mycelium.*

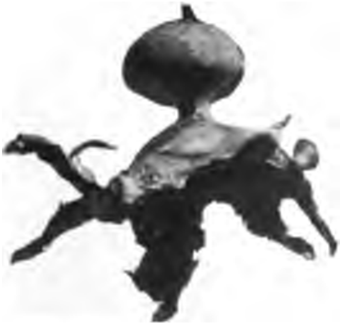

Fig. 79. Geaster pseudostriatus.

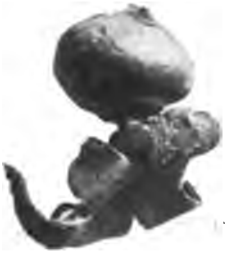

Fig. 80. Geaster pseudolimbatus.

Fig. 79 a plant that Dr. Hollos has recently described as a "new species," G. pseudostriatus. To our mind it is G. asper and differs but little from the form we have in this country. The longer peduncle, we consider only a condition, not an essential character.

Fig. 80 a plant that Dr. Hollos has recently described as G. pseudolimbatus. We should call it G. limbatus.

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BULLETIN No. 8. APRIL, 1905. MYCOLOGICAL SERIES, No. 3

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J. U. & C. G. LLOYD
CINCINNATI, OHIO

MYCOLOGICAL SERIES, No. 3

The Lycoperdaceae of Australia, New Zealand and Neighboring Islands

Illustrated with 15 Plates and 49 Figures

By C. G. LLOYD

INTRODUCTORY.

Australia is the richest country in the world in Lycoperdaceae, and more strange and endemic genera are found there than in any other continent. Our knowledge of the subject is based on relatively scanty material. Probably not more than a hundred specimens have reached the museums of Europe and most of these are at Kew. A majority of the species are known only from a single collection. I do not feel that the knowledge we have of the subject is more than introductory. The work that has been done with the Lycoperdaceae of Australia is mostly sporadic, scattered descriptions of supposedly "new species" by authors who desire to attach their names to them. The only systematic work is in Cooke's Handbook of Australian Fungi, which is a very complete compilation of this sporadic work. The author of this pamphlet has spent fourteen months in the museums of Europe in a systematic study of all the material to be found there, and he has been enabled to study practically all the type specimens on which descriptions of Australian species have been based. In addition we have solicited our correspondents to send us specimens and desire to acknowledge our indebtedness to the following who have kindly forwarded specimens:

MISS JESSIE DUNN, Wellington, N. Z.
F. M. READER, Warracknabeal, Victoria.
J. T. PAUL, Grantville, Victoria.
W. R. GUILFOYLE, Melbourne.
ROBERT BROWN, Christ Church, N. Z.
R. T. BAKER, Sydney, Australia.
J. G. O. TEPPER, Norwood, S. Australia.
ROBERT M. LAING, Christ Church, N. Z.
J. S. TENNANT, Ashburton, N. Z.
WALTER GILL, Adelaide, Australia.
W. W. WATTS, Sydney, Australia.

We are also advised of a shipment from **D. McALPINE, Melbourne,** sent to our Paris address (107 Boulevard St. Michel) but at the time this pamphlet was written the package had not reached us. Specimens received are acknowledged in detail under the species to which they belong.

CORRECTIONS.

The plates and the first form were printed in the absence from home of the author. Several mistakes have occurred.

Secotium melanocephalum page 7, correct to melanosporum.
Phellorina Delastrei page 10, correct to Delestrei.
Scleroderma verrncosum, Plate 31, correct to verrucosum.
Castoreum radicatus, Plate 38, correct to radicatum.
Scleroderma aurantiacum, Plate 31, correct to aurantium.

C. G. LLOYD,

Paris Address:

107 Boulevard St. Michel, - - Paris, France.

THE GASTROMYCETES.

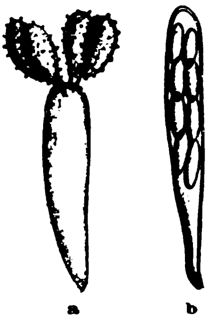

Fig. 1.
a—A basidium, bearing spores.
b—An ascus, containing spores.

Fungi, the larger fungi, are divided into two classes, 1st, the Basidiomycetes, which have the spores borne free on a basidia; 2nd, the Ascomycetes, which have the spores borne in a sack called the ascus. In this pamphlet we have to deal only with part of the first class.

The Basidiomycetes can in turn be divided into two very natural classes, 1st, the Hymenomycetes, those that have the spores exposed and free from the beginning, or at least from a very early state; 2nd, the Gastromycetes, those that develop the spores in cavities or chambers within the tissue of the plant.

It should not be inferred from the above that in order to recognize the Gastromycetes it is necessary to study the nature of the basidia, or to make other minute anatomical examination. As a matter of fact, the merest tyro soon learns to recognize on sight the various phalloids, bird-nest fungi, and various kinds of "puff balls" constituting the Gastromycetes and they were well classified before their anatomical structures were known.*

CLASSIFICATION.

Gastromycetes can be readily divided into four families widely differing from each other as to the nature of the mature plants.

FAM. 1.—PHALLOIDEAE.—PHALLOIDS. Plant fleshy, enclosed in a gelatinous volva when young. The gleba deliquescing and becoming a mucilaginous (generally foetid) mass.

Phalloids are noted for the foetid odor that they have and for their bizarre shapes. They force themselves to the attention of the most unobserving and are often called such appropriate names as Stink Fungus, Stink Horns, Dead Men's Fingers. Australia is particularly rich in these bizarre plants.

FAM. 2.—NIDULARIACEAE.—NEST FUNGI. Plants shaped like little cups, opening at the top, and containing a number of little seed-like bodies (peridioles). They look something like little birds' nests and are often called "Birds-nest fungi."

FAM. 3.—HYMENOGASTRACEAE.—HYPOGEAL FUNGI. Peridium indehiscent; gleba cavities permanent, not resolved into a mass of spores; capillitium absent.

This family is mostly subterranean like the true tubers or truffles. The Australian species are little known.

FAM. 4. LYCOPERDACEAE.—PUFF BALLS.—Ripe peridium enclosing a mass of dry spores, often mixed with capillitium. Sometimes the gleba walls persist forming peridioles, but in those cases the peridioles are filled with a mass of dry powdery spores.

The largest and most frequent tribe of Gastromycetes and embracing all the families known as "puff balls."

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* We have issued a pamphlet entitled "The Genera of Gastromycetes" in which the various terms employed in the description of these plants are explained. A copy will be mailed on application to The Lloyd Library, Cincinnati, Ohio, U. S. A.

Australian Genera of Lycoperdaceae.

It is not in the province of this pamphlet to consider the first three families of the Gastromycetes, and the following key embraces only the Lycoperdaceae.

TRIBE 1.—PODAXINEAE.—Plant stalked. Stalk continuous to the apex forming an axis.
Gleba a mass of spores and capillitium surrounding the axis,
. . . . PODAXON.
Gleba of permanent cells, not resolved into a mass of spores,
Peridium wanting . . GYMNOGLOSSUM.
Peridium dehiscing by breaking away at the base,
. . . . SECOTIUM.
Dehiscence of peridium unknown . . . . CLAVOGASTER.

TRIBE 2.—TYLOSTOMEAE.—Plant stalked. Stalk distinct from the peridium, or not continuous as an axis to the apex.
Peridium opening by an apical mouth,
Stipe inserted into a "socket" at the base of the peridium . . . . TYLOSTOMA.
Peridium seated on the dilated apex of the stalk,
. . . CHLAMYDOPUS.
Peridium dehiscing by an irregular opening,
Peridium continuous with the stipe . . . PHELLORINA.
Peridium opening circumscissally . . . . BATTARREA.

TRIBE 3.—SCLERODERMEAE. Gleba of globose rough spores mixed with fragments of the hyphae tissue. Capillitium none.
Walls of the gleba cells persistent, forming peridioles
. . . . POLYSACCUM.
Walls of the gleba cells mostly disappearing, or only partly persistent . . . . . . SCLERODERMA.

TRIBE 4.—LYCOPERDEAE.—Plant not stalked. Spore mass dry spores mixed with capillitium.

TRIBAL ALLIANCE 1.—GEASTRAE.—EARTH STARS.—Peridium double, outer peridium thick, persistent, splitting into segments and recurving . . . . GEASTER.

TRIBAL ALLIANCE 2.—BOVISTAE,—TUMBLERS.—Outer peridium thin. Inner peridium firm or cartilaginous. Mature plant loosened from place of growth.
Peridium cartilaginous. Capillitium of separate threads with slender pointed branches . . . BOVISTA.
Peridium thick. Capillitium of separate threads bearing spiny points . . MYCENASTRUM.
Peridium firm. Capillitium threads mostly simple, short, unbranched with blunt ends . . . . . CATASTOMA.

TRIBAL ALLIANCE 3.—LYCOPERDAE.—TRUE PUFF BALLS.—Peridium flaccid. Plant normally attached to place of growth.

Peridium opening by a definite mouth,
Spores pedicellate . . . . BOVISTELLA.
Spores without permanent pedicels . . . . LYCOPERDON.
Peridium rupturing irregularly and falling away in pieces, ... CALVATIA.

TRIBE 5.—ANOMALAE.—Not allied to the previous tribes or to each other.

Gleba of permanent cells, forming a thin layer adhering to the peridium . . . . GALLACEA.
Peridium double. Spores fusiform subhyaline . . CASTOREUM.
Gleba composed of separate peridioles containing the spores . . . . ARACHNION.
Gleba surrounding a hard central core. . . . MESOPHELLIA.
Young plant enclosed in a gelatinous volva MITREMYCES.

Australian Species of Lycoperdaceae.

THE GENUS PODAXON.

Stalked plants, the stem continuous to the apex of the plant forming an axis for the gleba. Peridium usually cylindrical, dehiscing by breaking away at the base. Gleba a mass of spores and capillitium surrounding the axis.

The genus Podaxon grows only in hot sandy countries and is most abundant in Africa though known from every continent except Europe. In the United States it occurs only in the arid regions of the West. Many species of Podaxon have been described but are better referred to as descriptions of separate collections than of species. The characters are based on the color of the gleba, size and shape of spores, and abundance or scantiness of capillitium, but all of these characters vary in the same species I think.

PODAXON AEGYPTIACUS (Plate 25, fig. 1, 2 & 3).—Pileus short cylindrical 3 to 5 cm. long. Gleba very dark, almost black, but with a reddish tinge. Capillitium abundant deeply colored. Spores dark color, subglobose or ovoid, 10–12 mic.

This little plant, the smallest of the species, was first described from North Africa. Its occurrence in Australia is based on some specimens received from R. T. Baker, Sydney, collected by R. H. Cambage at Bourke.*

PODAXON MUELLERI (Plate 25, fig. 4 & 5).—Plant about 20 cm. high. Gleba light olive color. Capillitium abundant, cobwebby, almost hyaline. Spores olive.

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* At Kew there is a poor specimen, from "Sutton River" on which the record of "Podaxon Indica" in Cooke's Handbook is based. Podaxon Indica is a very bad name and has no excuse to exist, not even priority. Linnaeus called a plant from India Lycoperdon pistillaris and the plant is now in his herbarium. Fries designated the Linnaean plant as Podaxon pistillaris, to which genus it belongs. Sprengle compiled it and changed the name arbitrarily to Mitremyces indicum. It has no relation to the genus Mitremyces and there was no reason to change the specific name. Most authors have used the specific name pistillaris. A few modern authors use the name Podaxon indica which made a "new combination" but apparently that is the only reason for its use. According to my views based on the type, Podaxon pistillaris differs from Podaxon aegyptiacus in having scanty subhyaline capillitium.

This appears to be the most frequent species in Australia and we have seen three collections. Two at Kew from "Darling River, Kennedy 1887" and "near Sydney, E. P. Ramsey" and one collection at Berlin from Baron von Mueller.*

THE GENUS GYMNOGLOSSUM

Peridium wanting. Gleba of permanent cells, closely related to Secotium. Capillitium none. Spores (fig. 2) elliptical, smooth.

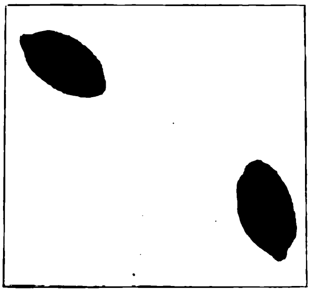

Fig. 2.

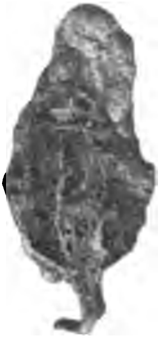

Fig. 3.

GYMNOGLOSSUM STIPITATUM.—The only specimen known is at Kew (fig. 3) and was collected at Moonan Brook. N. S. W. by Miss Carter. Its general appearance now is like a shriveled pear. The peridium is entirely absent from the specimen hence it can be well compared to the subterranean genus Gauteria. Whether the peridium is absent at every stage of growth or has fallen off, I think, cannot be told from the specimen. A very good illustration is given of it in Cooke's Handbook I think, except the walls of the gleba cells are much too thick.

THE GENUS SECOTIUM.

Plant with a stalk,† continuing as an axis to apex of the plant. Gleba permanent cells Peridium dehiscing by breaking away at the base. Spores mostly elliptical or oval.

One species of the genus Secotium is widely distributed over Europe and America, viz. S. acuminatum, but occurrence in Australia is not certain. The Australian species are mostly endemic and several of them are very imperfectly known.

SECOTIUM ERYTHROCEPHALUM (Plate 26, fig. 1, 2, 3, 4, 5 & 6)—Peridium thin, somewhat fleshy when fresh, subglobose. *bright red*. When fresh it is plump and smooth, but shrivels and wrinkles in drying. Stem 3 to 5 cm. fleshy, inserted in the base of the pileus. Gleba light brown color with large irregular cells. Spores elliptical, smooth, light yellow under the microscope, about 6x12 mic.

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* The Kew specimens were labeled Podaxon calyptratus and Podaxon pistillaris and one is the basis of Podaxis axata in Cooke's Handbook. The Berlin specimen was labeled "Podaxon Muelleri n. s." but I think was never published. Those who believe in the advertising feature will however, kindly add Dr. Henning's name to it.

Fries based his "Podaxon calyptratus" as did Desvaux his "Podaxis senegalensis" on Bosc's old crude cut of "Lycoperdon axatum" (hence the name Podaxon axatus as recently changed). Bosc's old crude figure and his description give not the slightest clue to the species and nothing can be told from it excepting that it is a Podaxon. As to the species however, it is the purest guess work Massee designates Podaxon loandensis of Africa under this name, which was a good guess, both plants having come from the same country, but Podaxon loandensis differs from the Australian plant in the scantiness of its capillitium.

There are at Kew also the remnants of a plant from "Brisbane, Bailey" labeled "Podaxon carcinomalis var. elatior." It is a much taller plant than the South African plant Podaxon carcinomalis, with a stem about an inch thick. The spores are very much like the African plant, but I should not wish to form an opinion on this specimen.

† All the well known Australian species have long stalks but species from other parts of the world sometimes have very short stalks.

This was the second species of Secotium known. It was beautifully described and figured by Tulasne (Ann. Sci. Nat. 44–115). It appears to be the most frequent species in Australasia ; abundant specimens are at Kew, Paris and Upsala from New Zealand and Tasmania. We have seen none from Australia. Most of the specimens are labeled as growing on the ground, but we note one from Colenso "on rotten wood."[*]

Specimens in our Collection.

Christ Church, New Zealand, Robert Brown.

SECOTIUM COARCTATUM (Plate 26, fig. 7 & 8).—Peridium obovate, pale tan color, constricted at the base, the margin somewhat irregularly torn, evidently forming a veil in the young plant. Stem 3 to 5 cm. long, reaching the apex of the peridium. Gleba light brown, formed of small irregular cells. Remote from the stem below, and covered with a membrane forming a cup into which the stem is inserted. Spores small, smooth, oval, 5x6 mic.

But one collection of this plant is surely known, collected by Drummond, Swan River about sixty years ago. The specimens existing are rather fragmentary, and we could obtain no good illustration from them. Berkeley however, gave a good illustration and description (Hook. Jour. 45–63).

Recently a very similar and probably the same species was collected in Texas, U. S. A by W. H. Long, Jr. The only difference we can note is that the gleba in the American plant is much darker color. The illustrations are made from the American plant and an unusually large specimen. The plant is apparently as rare in the United States as in Australia, for we know of only these two collections and we are not sure they are the same species. The Australian plant is said to be strongly scented.

sporum.

SECOTIUM MELANO~~CEPHALUM~~ (Plate 26, fig. 9, 10, 11 & 12).—Pileus 5–8 cm. in diameter, subglobose. Stem 5–8 cm. high, thick, solid. Gleba dark brown, almost black, with small irregular cells remote from the stem below. Spores dark, almost black, smooth, oval, 6x8 mic.

This plant differs from all other known species by the dark color of the gleba and spores. It is only known from one collection by Drummond at Swan River made about sixty years ago. We present on our plate, photographs of these specimens as they are preserved at Kew. The sticks shown in one are put through the specimen to hold the stem in place.

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[*] A recent European writer, Dr. Hollos, who evidently never saw a specimen, published that Secotium erythrocephalum is the young condition of Secotium acuminatum of Europe The doctor never made a worse guess in his life and the publication of such statements does not advance science.

Imperfectly Known Species of Australia.

Secotium acuminatum is a very common plant in the United States, Northern Africa. Hungary and Russia, but I do not feel assured of its occurrence in Australia from the small fragments so labeled that I have seen. The determination is very doubtful.

Secotium scabrosum (Grev. 20-35). All that is known of this plant is a single head with the stem gone. It has a close resemblance to erythrocephalum, but has larger, *rough* spores.

Secotium virescens (Grev. 19-47) is based on the merest fragment.

Secotium Gunnii (Grev. 19-96) is based on the merest fragment and is probably I think Secotium coarctatum although the spores are a little larger.

Secotium Rodwayi (Kew Bull. 01-158). These little specimens are about the size of peas. Said to be subterranean and only exposed when thrown up by marsupials. The spores, almost globose and *rough* are quite peculiar. In these specimens they are almost hyaline. I think the plants are not mature.

Secotium lilacense (N. Zea. Flor.) is based on a lilac colored figure. It is said to grow on wood. There are no specimens known.

Secotium leucocephalum (Grev. 19-95). These specimens were collected by Berggren in New Zealand and at first supposed to be pale forms of S. erythrocephalum, which they closely resemble in general appearance. They were separated when it was noticed that they had rough spores. I did not get a photograph of them. I should call the color pale, but not white.

THE GENUS CLAVOGASTER.

Plant clavate, stipitate. Peridium single, dehiscing (?) Columella (?). Gleba of permanent cells. Spores smooth, oblong, pedicellate.

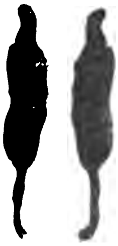

Fig. 4.

CLAVOGASTER NOVO-ZELANDICUS. —This plant is known from a single half specimen (fig 4) collected at Auckland New Zealand by Dr. Häusler and preserved at Berlin. It has been claimed that the plant belongs to the genus Cauloglossum* and the name Cauloglossum novo-zelandicum proposed. It seems to me the plant is closer to the genus Secotium, having the same spores and gleba. I could not tell whether it has a columella or not. As long as the plant is known from such scanty material, the name might just as well be left as it is, until more material is found. It would be recognized at once by its shape.

THE GENUS TYLOSTOMA.

Peridium globose, furnished with a protruding tubular mouth or opening irregularly, stipitate. At the base the peridium has a sort of "socket" into which the stipe is inserted. Gleba of branched sometimes septate threads and abundant, globose spores.

The genus Tylostoma is wide spread over the earth and the species are not well worked out. The Australian collections are very scanty, and I feel, very imperfectly known. I shall not attempt a description from such material.

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* A genus known only from the United States.

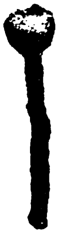

Fig. 5.

TYLOSTOMA MAMMOSUM (Fig. 5).—There is one collection at Kew "White River 1870" which I think is the same as the European species. This species is the most common one in Europe and the only one known to occur in England.

TYLOSTOMA LEPROSUM.—I have seen only a very poor specimen. It is not as "spotted" as its name indicates. The "lurid umber mealy scurf" is the ordinary veil that all Tylostomas have which in this specimen happens to pull off somewhat in patches.

TYLOSTOMA WIGHTII—Was based on a plant from India. I have seen no specimen purporting to come from Australia.

TYLOSTOMA FIMBRIATUM.—There are specimens so labeled from Swan River, but their mouths do not show. Notwithstanding a recent "picture" has been made, showing the supposed "fimbriate mouth" character of this European species, I have been unable to find in Museums any specimen from Europe with such a mouth, and I question if such a species exists in Europe. There are species with such mouths in South America.

TYLOSTOMA ALBUM.—The specimen on which this is based is old, weathered, and bleached out. It has a large head and a short thick stalk, but I could not make out its mouth characters.

TYLOSTOMA PULCHELLUM.—Said to be a minute species that grows on branches(?). It was described by Saccardo (Bull. Soc. Myc. 89, p. 118). I have seen no specimens.

We have received Tylostomas very scantily from our Australian correspondents. A single specimen from F. M. Reader, Victoria, is we think, Tylostoma Purpusii recently described from the Western United States. A specimen from J. G. O. Tepper has a protruding mouth and would ordinarily be referred to Tylostoma mammosum of Europe, but it is not that species.

THE GENUS CHLAMYDOPUS.

Peridium globose, seated on the broad, concave apex of the stem. Capillitium and spores as in the genus Tylostoma. Stipe long, thick and concave at the apex tapering to the base. Volva persistent as a cup at base of plant (usually absent in herbarium specimens.)

The genus Chlamydopus can well be (as it is by some authors) classed with the genus Tylostoma. It differs in the attachment of the peridium to the stem. In Chlamydopus the peridium is seated on the broad, concave apex of the stem. In Tylostoma the stem is inserted into a "socket" in the base of the peridium.

CHLAMYDOPUS MEYENIANUS. — But one species is known originally from Peru, but found also in Western United States (cfr. Myc. Notes, p 134, plate 10). But one specimen (fig. 6) is known from Australia, collected Gascoyne River by Mrs Gribble and described (Grev. 15–94) as Tylostoma maximum.

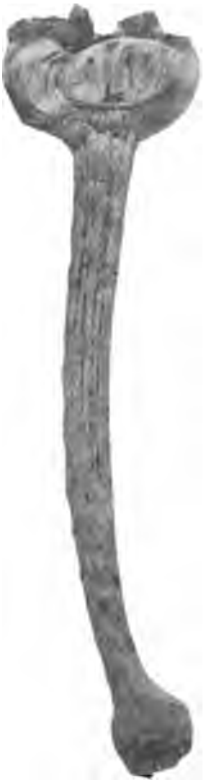

Fig. 6.

THE GENUS PHELLORINA.

Plants with a long stalk, not prolonged to the apex of the peridium. Gleba homogenous, consisting of globose spores and scanty capillitium threads.

The genus Phellorina was proposed by Berkeley (Hook. Jour. 43–417) for a stalked plant from South Africa. The stem of this specimen was hollow, but no one knows if the plant that grew on the next hill had a "hollow stem". Montagne proposed the genus Xylopodium on virtually the same plant from North Africa, the main difference being that his plant had a solid stem. There is a question if Montagne's and Berkeley's specimens are not co-specific ; there is no doubt they are co-generic and that Xylopodium is a synonym for Phellorina.

The genus Phellorina grows only in sandy countries It is known from South and North Africa, Australia, India, Afghanistan, and rarely in southern and western United States.

PHELLORINA DELASTREI (Plate 27, fig. 1 & 2).—Plants with a thick, woody stalk. Peridium double, the inner thin but firm, same texture and a continuation of the woody stem. Outer of large, loose, thin, scale-like membrane. The peridium when mature opens irregularly at the apex. Gleba uniform, filling the cavity, bright ferruginous in color. Capillitium scanty, light colored or subhyaline threads. Spores globose granular, 6–7 mic.

This species was described* from North Africa, where it is not rare. Its occurrence in Australia is based on a large specimen (Plate 27, fig. 2) at Kew, collected at Stewart's Range, Central Australia, by Charles Winnedse

It is considerably larger than the plant usually becomes in North Africa, and is the only specimen known from Australia.

PHELLORINA STROBILINA (Plate 27, fig. 3).—Plant with a thick, woody stem. Outer peridium cracking into large, thick, angular scales. Spores globose, verrucose, 5–6 mic.

This curious plant is known only from Australia and but two specimens; one the type at Berlin (see plate 27, fig. 3) from Rockhampton, Queensland, the other at Kew from Darling River, Bennett.

A grotesque figure purporting to represent the plant was published in Engler and Prantl.†

SYNONYMS. — Scleroderma strobilinum (Grev. 4–74), Areolatia strobilina (Sacc. 7–144) Xylopodium ochroleucum (Grev. 15–95) based on a very immature specimen.

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* Xylopodium Delastrei (Flo. Alg. p. 390.)

† If the "artist" who drew this figure took for his model an artichoke, such as is common in the French markets, he did fairly well, for the figure is very good of an artichoke. It has however, no resemblance to the puff-ball.

PHELLORINA AUSTRALIS.—Stem short. Outer peridium rugulose,* light yellow. Gleba bright ochraceous. Spores globose, rough, 5–6 mic.

It is with considerable doubt that we refer a specimen received from F. M. Reader (Fig. 7) to Berkeley's species. The plant differs from Phellorina Delastrei in its shorter stem, the peridium not covered with loose scales, the bright ochraceous color of the gleba. The type specimen of Phellorina australis (Xylopodium australe Linn. Jour. 13, 171) at Kew is very old, almost without gleba and has a much longer stem than the plant sent by Mr Reader.

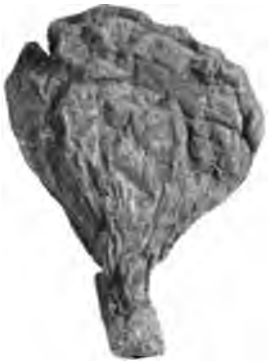

Fig. 7.

Specimens in our Collection.

Warracknabeal, Australia, F. M. Reader.

THE GENUS BATTARREA.

Young plants enclosed in a volva. Peridium stalked, opening circumscissally, the top falling away leaving the gleba borne on a lower half of the peridium. Gleba yellow-ferruginous, consisting of globose, minutely warted spores, subhyaline capillitium, and a special capillitium that no other genus has. This "false capillitium" consists of thick cells with the walls spirally thickened which are known as "annulated cells."

The genus Battarrea is a wide-spread genus, but the individuals are usually of rare occurrence. The plants (see plate 28) present a strange appearance. Recently the theory has been advanced that all forms belong to the same species and it must be admitted that the gleba characters, spores, capillitium and "annulate cells" are nearly the same in all of them. However, the plants vary in different countries very much as to size and stature as well as the nature of the scales on the stem and I think five species† or forms can be distinguished.

BATTARREA PHALLOIDES (Plate 28, fig. 1) —This is the little species, with fine stem scales which grows in England and France. Many of the specimens we have seen have stems no thicker than a lead pencil. Such little plants from Australia are at Kew, collected at Israelite Bay by Miss Brooks.

BATTARREA STEVENII (Plate 28, fig. 2 & 3).- This form is originally known from Russia. It differs from the English form in its more robust growth and the thick, lacerated scales covering the stipe. It is unquestionably only a form of B. phalloides and cannot be distinguished by any sharp lines. There are specimens from Australia at Kew, from "Swan River" and from "Victoria."[*] We present on our plate, photograph of our West American plant as we have no specimens from Australia.

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* Probably from drying. It seems to me it was even and smooth when fresh.

† Battarrea phalloides, Stevensii, Digueti, Guicciardiniana and levispora.

THE GENUS POLYSACCUM.

Peridium a single layer, when mature very fragile, breaking irregularly or crumbling away. Gleba consisting of numerous cells, containing the spores [†] Walls of the gleba cells permanent, crumbling away as the spores are dissipated. Capillitium none [‡] Spores globose, rough.

This genus is easily recognized on account of the permanent gleba cells, little sacs (peridioles) that give the plants a honeycombed appearance when broken. It is rather a rare genus in America and Europe, but seems to be quite common in Australia, judging from the number of specimens I have received.

The genus is close to Scleroderma, some specimens having the gleba-cell walls so fragile that the plants can be taken for Scleroderma. There exists in the tissue of the peridium and walls of the peridioles a yellow coloring matter readily soluble in water. As it occurs in the plant it is black, but dissolved in water it is yellow. The plant is still used in the country districts of France (I am told by Monsieur P. Hariot of the Museum of Paris) for dyeing purposes.[§]

POLYSACCUM PISOCARPIUM.—Peridium subglobose, contracted into a short rooting stem. Spores globose, warted.

The "species" of Polysaccum are much more puzzling than the genus, because they shade into each other and it is not practicable to draw sharp lines between. The characters of the "species" are drawn from color of gleba, size and shape of plants and neither character is of any value. Extreme forms seem widely different and would be good species if it were not that more specimens occur that are intermediate between the extreme forms than typical of them. The following are convenient names to designate extreme forms.

POLYSACCUM PISOCARPIUM (Plate 29, fig. 1 & 2).—The usual form that occurs in Australia. Sub-globose contracted into a short, rooting stem. Typically illustrated (Plate 29, fig. 1).

SYNONYMS.—Polysaccum album (Grev. 20–36) a young condition with smooth, white, even peridium. Polysaccum australe (Ann.Sci.Nat.3-9-136). Polysacum microcarpum, (Grev. 16–28) a small spored form, quite frequent in Australia, but is not known in Europe or America.[*] Polysaccum umbrinum, a form with umber-brown gleba. It was described as Scleroderma umbrinum (Grev. 19-45) but the perfect peridioles are quite evident in the type specimen. Favillea argillacea (Fungi Natal, p. 32), is probably a synonym.[†]

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[*] Two species have been described from Australia, neither however, presenting any points of specific importance.

Battarrea Mulleri (Grev. 9–3) described as white, because an old weather bleached specimen as frequently found in collections.

Battarrea Tepperiana (Bull. Soc. Myc. 89–XXXIV) is a small form with very scaly stem, but there is nothing specific about it.

[†] These cells are often called peridioles, but they are quite different in their nature from those of the Nidulariaceae or the genus Arachnion.

[‡] Remains of the hyphae of the walls of the gleba-cells are usually mixed with the spores.

[§] Which suggests a query to the modern name changers who have dug up Pisolithus arenarius why they did not dig up Persoon's specific name tinctorium which is both prior and more appropriate.

POLYSACCUM CRASSIPES (Plate 29, fig. 3 & 4).—Peridium tapering into a strong, thick, rooting base. The typical form in Europe and America is a strong plant with a thick, rooting base as large as a man's wrist. I have not seen the typical form from Australia. Smaller forms are more common and shade into the previous form. Fig. 4 is from an Australian specimen.

SYNONYMS.— Polysaccum turgidum (Fr. Syst. 3-53) has been recorded from Australia, Polysaccum marmoratum (Linn. Jour. 13-171) a small, slender, spotted form due to unequal development of the coloring matter in the peridium

POLYSACCUM TUBEROSUM (Plate 29, fig. 5 & 6).—A globose form with scarcely any stem or rooting base. It is rare in Europe and usually has a black, smooth peridium. I have seen no typical specimens from Australia, but Polysaccum pusillum (Jour. de Bot. 03-13) from New Caledonia I consider a synonym.

POLYSACCUM CONFUSUM—(Grev. 16-76) (Syn. Polysaccum australe Grev. 5-29) is a form with small spores, almost smooth, and very thin walls to the peridioles. The figure Handbook No. 124 is much too yellow and the peridioles are not near so large as there shown.

Specimens in our Collection.

(Typical form as to shape)
Adelaide, Australia, Walter Gill, (Spores vary 6-12 mic.)
New Caledonia, from P. Hariot, (Spores 6-7 mic.)
Melbourne, Australia, W. R. Guilfoyle, (Spores 8-9 mic.)
(Form approximating crassipes)
Melbourne, W. R. Guilfoyle, (Spores 6-7 mic.)
Sydney, Australia, R. T. Baker, (Spores 8-9 mic.)
(Form tuberosum)
Grantville, Australia, J. T. Paul, (Spores 5-6 mic.)
New Caledonia, from P. Hariot (Spores 8-12 mic.)

THE GENUS SCLERODERMA.

Peridium single, usually thick, opening by an irregular mouth or (in one section of the genus) splitting into stellate segments. Gleba homogenous. Capillitium none. Spores globose, rough, usually mixed with remains of the hyphae tissue

Scleroderma is common and of world wide distribution. The genus can be recognized at once, but the species are very puzzling, running into each other in a most perplexing manner.[‡] The genus is readily divided into two sections.

Sterrebeckia. Peridium splitting into stellate lobes.[¶]
Euscleroderma. Peridium opening by an irregular mouth.

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[*] The spores of the European forms run 8-10 mic. Many specimens from Australia have spores 5-7 mic.

[†] The type does not exist. The genus is said to have "rare capillitium from the base of the peridium." I have seen in Fries' herbarium a specimen of Favillea degenerans (Plant. Priess p. 159, Polysaccum? degenerans Cooke's Hand. p. 245) which is a Polysaccum with very fragile peridioles.

[‡] The Friesian arrangement of species has generally been followed in Europe since the appearance of Systema. The following are the leading characters of the Friesian species:
S. Geaster, Peridium splitting into stellate lobes.
S. vulgare, Peridium thick opening by an irregular mouth.
S. verrucosum, Peridium thin, opening by an irregular mouth.
S. Bovista, yellow flocci mixed in the gleba.

Scleroderma vulgare, I think should be split in two species following Persoon. S. aurantiacum with large rough scaly warts. S. cepa relatively smooth and paler. It is very rarely that we find specimens of Sclerodermas without yellow flocci in the gleba though the character is much more strongly developed in some specimens than in others. Still I feel that S. Bovista is not a practicable species.

[¶] This section is the basis of the genus "Sclerangium", a genus I think based on an error. (cfr. Myc. Notes, p. 182.)

SECTION STERREBECKIA.

SCLERODERMA GEASTER (Plate 30, fig. 1, 2 & 3) —Peridium thick, black, opening by stellate lobes.

This is not a rare plant in Europe and the United States, but I have no notes of having seen the typical form from Australia. It can be recognized even in the unopened state by the thick rough, (pale colored when young) peridium.

Specimens in our Collection.

New Caledonia, given by P. Hariot.

SCLERODERMA FLAVIDUM (Plate 30, fig. 4, 5 & 6).—Peridium smooth, thick, yellowish, opening by stellate lobes.

This is the common form in Australia and the numerous specimens that reached Berkeley were always referred to Scleroderma Geaster. It can well be considered a small. smooth, yellow form of that species with a thinner peridium. The plant is not rare in the United States, less frequent in Europe.

Unopened specimens cannot be told from Scleroderma cepa.

Specimens in our Collection.

Australia, Adelaide, Walter Gill. *Melbourne*, W. R. Guilfoyle.

SECTION EUSCLERODERMA.

SCLERODERMA CEPA (Plate 31, fig. 1).—Peridium thick, smooth, yellowish, opening by an irregular mouth.

This is not a rare species and widely distributed. The following from Australia may be unexpanded specimens of Scleroderma flavidum.

Specimens in our Collection.

Andover, New Zealand, Robert Brown. *Sydney, Australia*, R. T. Baker.

SCLERODERMA TEXENSE (Plate 31, fig. 2, 3, 4 & 5).—Peridium thick, smooth. Cells of the gleba subpersistent.

We have seen at Kew several collections from Australia, of this species, originally noted from Texas. It is characterized by the persistent gleba cells, a character tending to throw the plant into the genus Polysaccum.† It is a rare plant in the United States and does not occur in Europe to our knowledge It is really, I think, an exaggerated form of the plant with yellow flocci which Fries called Scleroderma Bovista.

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† The genera Scleroderma and Polysaccum run together in the nature of the gleba and in an intermediate case we decide by the nature of the peridium.

NOTE.—We have found at Kew no type specimens of Scleroderma pandanaceum (Linn. Jour. 13–171). Scleroderma aureum (Grev. 18–26), Scleroderma australe (Grev. 18–26). One of them is said to have "smooth" spores which would be a very unusual character in the genus Scleroderma.

SCLERODERMA AURANTIACUM (Plate 31, fig. 6 & 7).—Peridium thick, rough with large scales, yellowish, opening by an irregular mouth.

This is the most common form in Europe and America. We have also a fine typical collection from India. In the United States it generally occurs associated with chestnut trees. We have no record of having seen the typical form from Australia, but do not doubt that it occurs there. Having no photograph of an Australian specimen we present illustration from America.

SCLERODERMA VERRUCOSUM (Plate 31, fig. 8 & 9).—Peridium thin, yellowish, densely marked with small scales.

The character of this species is the thin peridium. It is a misnamed plant, for it is not near as "warty" as the preceding species. The typical form occurs in Europe and usually has a strong rooting base In the United States the typical form is very local* but we have very common and widely distributed a little thin form which is a good "geographical species" and which we shall call Scleroderma tenerum. The plant varies to such an extent, it is difficult to draw the line. The following specimen from New Zealand is not typical. Our figure is the European plant.

Specimen in our Collection.

Wellington, New Zealand, Miss Jessie Dunn.

THE GENUS GEASTER.

Peridia double. Exoperidium splitting into segments and revolute away from the endoperidium. Mouth single. Capillitium mostly simple. Spores globose, mostly warty or minutely warty.

The genus Geaster is a large genus found in all countries. It is popularly known under the name "earth stars." A pamphlet "The Geastrae" in which the species of Europe and America (22 in number) are fully considered and illustrated was issued by the writer in 1902.†
In this pamphlet the genus was divided into the following sections:

Section 1.—Rigidae,
    Exoperidium strongly hygroscopic rigidly incurved when dry.

Section 2.—Non-Rigidae,
    Exoperidium not strongly hygroscopic.

    Sub section 1.—Mouths sulcate.
    Sub section 2.—Mouths even.

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* Confined to a few stations on the Atlantic Coast.

† It will be sent on application to Lloyd Library, Cincinnati, Ohio.

RIGIDAE.

This section is a very natural division of the genus readily recognized by the rigid incurved exoperidium segments of the dried specimens.

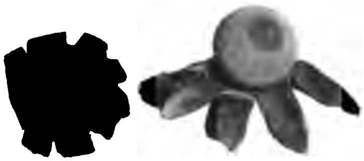

Fig. 8.

GEASTER DRUMMONDII.—Exoperidium strongly hygroscopic. Endoperidium sessile. Mouth sulcate, *darker color than the remainder of the peridium.* This beautiful little species has only been collected once in Australia by Drummond many years ago. It is marked by the *dark* sulcate mouth differing in this respect from Geaster striatulus.* Our figure 8 is from the type specimens at Kew.

GEASTER STRIATULUS — Exoperidium strongly hygroscopic. Endoperidium sessile. Mouth sulcate, concolorous with balance of the peridium.

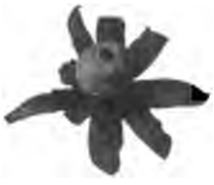

Fig. 9.

This little species was described (Grev. 9–3) from Australia. Though I have seen no specimens from Australia, this little plant is of wide distribution, reaching me from Sweden, Hungary, Africa and United States. It is everywhere a rare species Our figure (9) is made from a Hungarian specimen.

SYNONYMS.—Geaster Drummondii (Geastrae page 12, *not Berkeley*). Geaster umbilicatus, (Morgan's Flora *not Fries*). Geaster ambiguus,(Gast. Hung. *not Montagne*). Geaster Schweinfurthii, (Eng. Jahr. 14–361). Geaster mammosus (Ellis Exs. No. 110, *not Fries*).

GEASTER FLORIFORMIS.—Exoperidium thin, strongly hygroscopic. Endoperidium sessile. Mouth even, indefinite.

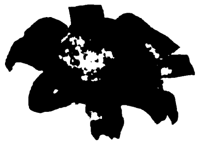

Fig. 10.

This species can be readily distinguished from the preceding by the mouth which is not sulcate The plant varies much in size (cfr. Myc Notes, p. 143), from a little tiny form not larger than a pea† to specimens with endoperidium a centimeter in diameter. The usual size is as we figure it (fig. 10) from American specimen. There are two collections at Kew from N. S. Wales and Victoria, both correctly labeled.

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* We regret that in our Geaster pamphlet we took another's opinion that Geaster Drummondii is the same as Geaster striatulus. The dark mouth which is the feature of the plant, is as good a character as exists in the Geasters. True, that specimens I have seen sometimes have this character only faintly indicated, but there are no "species" in this genus in which intermediate forms do not occur.

† Synonym. Geaster hungaricus Gast. Hung., p. 64.

SYNONYMS.—Geaster delicatus (Morgan's Flora, also Geastrae p. 11), Geaster hungaricus (Gast. Hung. p. 65, a small form.)

Geaster argenteus, specimens I have seen so labeled from Brisbane appear to me to be large form of G. floriformis bleached by exposure to the weather.

Specimens in our Collection.

New Zealand, Miss Jessie Dunn.

GEASTER SIMULANS.—Exoperidium thick, strongly hygroscopic. Endoperidium sessile, opening by an indefinite mouth. Spores small, globose, 4–5 mic.

This plant from Drummond Australia (fig. 11), I found in Museum at Paris, sent by Berkeley labeled Geaster rufescens. And at Kew under the same label and also the same collection (Swan River 174), labeled G. hygrometricus. It has no resemblance whatever to G. rufescens as now understood, but it is so close to G. hygrometricus that I doubt if any ordinary observer can tell them apart, judging from external appearances. The spores (fig. 12x1000) readliy distinguish it, being in this species the ordinary size of Geaster spores 4–5 mic. Geaster hygrometricus can always be recognized at once by having large rough spores (cfr Geastrae p. 8) 10–12 mic. in diameter, such as no other known species of Geaster has *

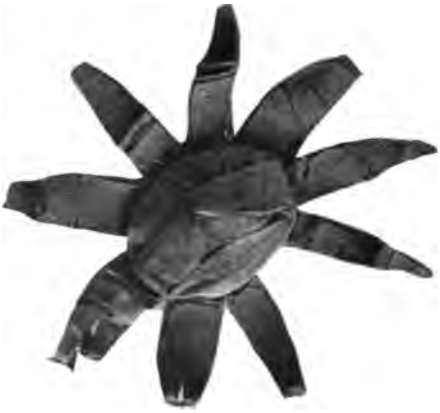

Fig. 11.

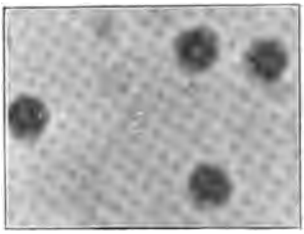

Fig. 12.

SECTION 2.—NON-RIGIDAE.

Sub-Section 1.—Mouths Sulcate.

GEASTER PLICATUS.—Exoperidium revolute. Mycelium layer generally adnate. Pedicel slender. Inner peridium subglobose, with a protruding sulcate mouth, *marked at the base with a definite area, strongly plicate.*†

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* From the scanty knowledge we have of the Australian puff-ball forms the "flora" seems to be as marked in the absence of species common to the remainder of the world as in the occurrence of species peculiar to the country. Geaster hygrometricus is a species common over the greater portion of the world. We have noted specimens from all over Europe and America, also Canary Islands, Madagascar, Guam, India, China, Japan, Madeira, Algiers and Persia, but we have no record of having seen a single specimen from Australia.

† All Geasters with sulcate mouths and pedunculate endoperidia viz:

Geaster pectinatus, G. Bryantii, G. asper and G. Schmidelii are easily considered a single species as intermediate forms connecting them all are frequent. There is however, a definite idea associated with each species or rather name viz:

Geaster plicatus, a definite plicate area at base of endoperidium.

Geaster Bryantii a groove at base of endoperidium.

Geaster pectinatus, absence of a definite plicate area or groove, though striae are frequent in the European plant.

Geaster Schmidelii, *small size* and thicker pedicel.

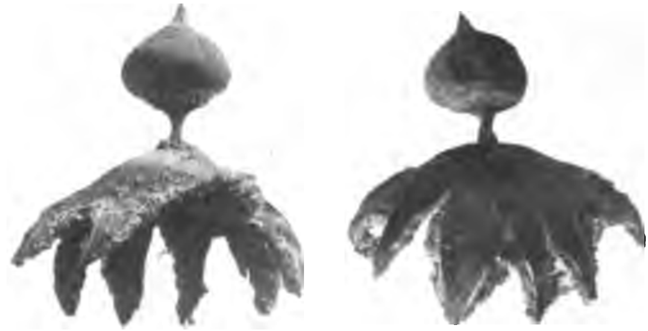

Fig. 13.

This species is at home in Asia and Australasia seeming to replace Geaster pectinatus and G. Bryantii of Europe. It was well described by Berkeley (Ann. Nat. Hist. 3–399) as Geaster plicatus from some specimens from Madras which are still preserved at Kew labeled "Geaster striatus var. plicatus Klotz." About 20 years later Berkeley redescribed it (Proc. Am. Acad. 4–124) from Bonin Island as Geaster biplicatus which would be a better name. Geaster Thwaitsii (Sacc. 7–471) from Ceylon has also the same peculiar characters. We have noted specimens in the above three collections at Kew from India, Ceylon and Bonin Islands and from New Caledonia at Paris, but the only typical plants from Australia we have seen were sent us by Mr. R. T. Baker, Sydney, Australia. Fig 13 is a photograph of these beautiful and characteristic plants.

Specimens in our Collection.

Sydney, Australia, R. T. Baker.

GEASTER PECTINATUS.—Exoperidium revolute, the mycelial layer usually adnate. Endoperidium pedicellate, even or slightly striate at the base. Mouth sulcate, beaked.

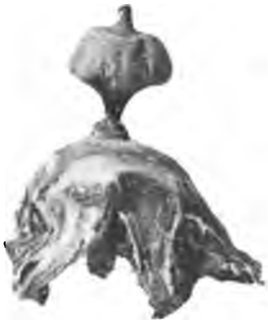

Fig. 14.

The home of Geaster pectinatus is Sweden where it is perhaps the most frequent species. It is rare in the greater portion of Europe, being replaced by Geaster Bryantii In the United States both species are rare. In Australia the large typical Swedish form I have never seen, but the plant called Geaster tenuipes (Hook. Jour. 48–576) I should refer to this species though smaller and intermediate between plicatus and pectinatus Two collections are at Kew, from Tasmania and N. S. Wales. The figure in Flora Tasmania, while good of the specimen from which it was made (still preserved at Kew) is not characteristic of the species, which usually has a more beaked mouth and exoperidium not concave but revolute. Fig. 14 is from an American specimen.

GEASTER SCHMIDELII—Exoperidium revolute. Endoperidium with short, thick pedicel. Mouth sulcate.

This little plant, rare both in Europe and United States, is separated from G. pectinatus (into which it merges by many connecting forms) by its small size and thick pedicel. Its occurrence in Australia is based on a single plant (fig. 15) received by me from J. G. O Tepper. This specimen is doubtful on account of its light color, but we think this plant was bleached.

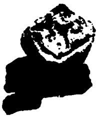

Fig. 15.

Specimen in our Collection.

Norwood, Australia, J. G. O. Tepper.

GEASTER ARCHERI.—Young plant acute. Exoperidium usually saccate, sometimes revolute. Endoperidium globose, *sessile*. Mouth sulcate.

This plant belongs to the reddish series and can be at once distinguished from all the preceding species by its *sessile* endoperidium. It is an infrequent plant both in Europe and America, and the only specimen we have seen from Australia was collected in Tasmania by Archer. It was described in Geastrae as Geaster Morganii but since having assured ourselves that it is the same as Berkeley named from Tasmania, we take pleasure in correcting it. The plant is Geaster saccatus in everything except the indefinite sulcate mouth. The illustration is from an American plant.

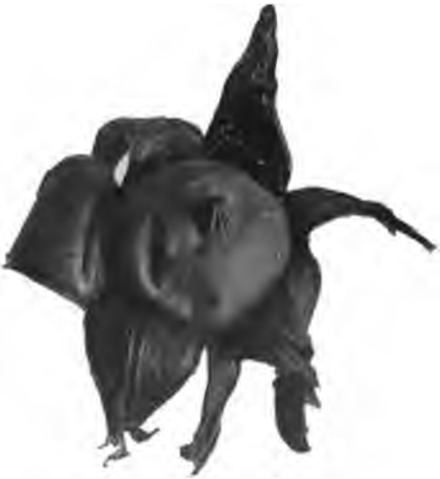

Fig 16.

GEASTER BERKELEYI.—Young plant acute. Exoperidium usually saccate, sometimes revolute. Endoperidium globose, *sessile*, furfuraceous granular. Mouth sulcate.

While described by nearly the same terms as Geaster Archeri, it is a larger plant with usually a rough endoperidium. It corresponds mainly to Geaster triplex excepting the sulcate mouth. It is a local plant only known from England and Australia. The Australian plants we have seen at Kew have the exoperidium thicker and cut in more narrow segments than the English plant and the endoperidium is not so rough. Our illustration (fig 17) is from the English plant.

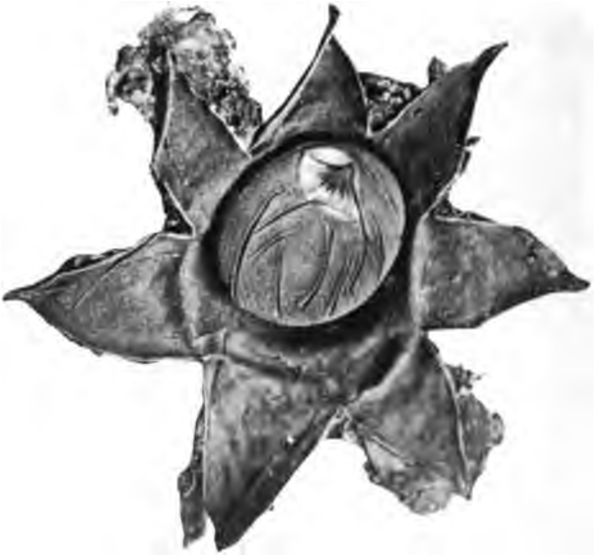

Fig. 17.

SUB-SECTION 2.—MOUTHS EVEN.

Plants Epigeous.

GEASTER MIRABILIS. Plants growing densely gregarious, the mycelium forming a dense cushion. Exoperidium light-colored, smooth. Endoperidium sessile, dark colored. contrasting with the light exoperidium.

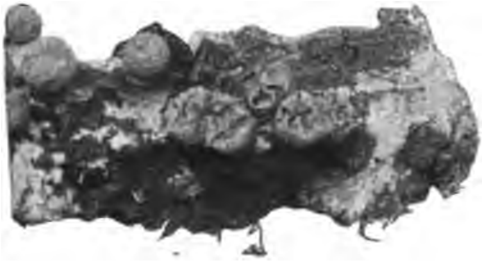

Fig. 18

This is a very variable plant, widely distributed but only in warm countries. It differs from most Geasters in that the plants are epigeous, developing on the top of the surface, also in the plants being borne densely gregarious on an effused mycelial subiculum.

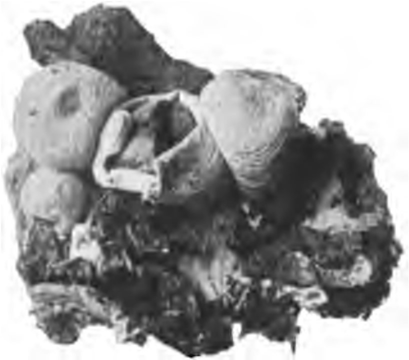

Fig. 19.

FORMS.

The plants vary much in size and in shape of unexpanded plants. Usually they are globose, sometimes somewhat oval. The typical form (Fig. 18) is very small ½ cm. in diameter but the only Australian form we have seen is larger about size of fig. 19. This large form has been called Geaster subiculosus (Grev. 15–97).

GEASTER VELUTINUS.—This species best known from the United States is epigeous and has a globose young form. We are not sure, but think Geaster dubius (Linn. Jour. 16–40) only known from a single collection of unexpanded plants made at Pennant Hill Pawametta on the voyage of the Challenger, is a young plant of this species. These specimens are smaller and not so velutinate as the American plant. It is to Berkeley's credit that he knew them to be unopened Geasters and did not refer them to the "genus Cycloderma."

Plants Not Epigeous.

EXOPERIDIUM FORNICATE.

In many species of Geaster occasionally the inner layer of the exoperidium splits away and arches up over the outer layer producing the form of plant known as "fornicate." Only two species are known however, in which this character is habitual.* Of these two species, I have seen, from Australia, a single specimen of Geaster fornicatus at Kew (labeled G. limbatus). The other fornicate species, G. coronatus, very common in the pine woods of Europe, is unknown from Australia

GEASTER FORNICATUS.—Outer peridium strongly fornicate, the mycelial layer forming a cup at base of plant. Fibrillose layer arched above the cup to which it is attached by the tips of the segments. Inner peridium urn shape, tapering below into a short thick peduncle. Mouth indefinite.

A single specimen of this plant is at Kew collected at Brisbane. The distribution of the species in the world is most peculiar. It is frequent in England, Hungary and Russia but absent from the remainder of Europe. It is known from but two localities in the United States, Texas and Catalina Island. I have seen specimens also from Mauritius, Cape Good Hope, Algeria and Hawaii. It seems to occur only in widely separated localities and to be absent from the greater portion of the earth's surface.

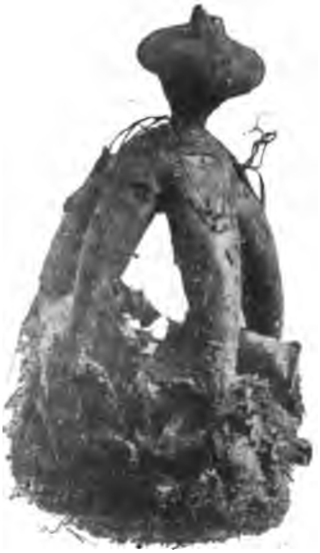

Fig. 20.

Exoperidium Saccate or Revolute.

ENDOPERIDIUM STALKED.

GEASTER MINIMUS.—Exoperidium revolute, cut to about the middle. Endoperidium with a short but distinct pedicel. Mouth definite.

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* Geaster velutinus takes the fornicate form frequently in warm countries but does not in more temperate regions.

This is one of the smallest species, very common in the United States. It is more rare in Europe. From Australia we have seen several collections at Kew and have received a specimen (Fig. 21) from J. G. O. Tepper, Norwood, that corresponds exactly with the American plant.

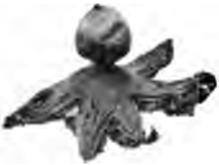
Fig. 21.

Specimen in our Collection.

Norwood, Australia, J. G. O. Tepper.

GEASTER RUFESCENS.—Unexpanded plant globose. Exoperidium revolute. Pedicel short but thick. Mouth indefinite.

This species which is rather rare both in Europe and America, is a reddish plant almost the same as Geaster limbatus, which is not known from Australia, and is a black plant. The only specimen we have seen from Australia is the plant called Geaster Readeri (Grev. 16–73) which is smaller than the usual American form. Our illustration (fig. 22) is from an American plant.

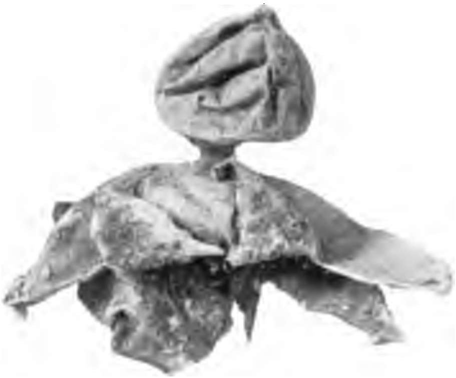
Fig. 22.

Endoperidium Sessile.

GEASTER SACCATUS.—Unexpanded plant acute, Mycelium sub-basal. Exoperidium saccate, the segments revolute. Endoperidium sessile, the mouth definite.

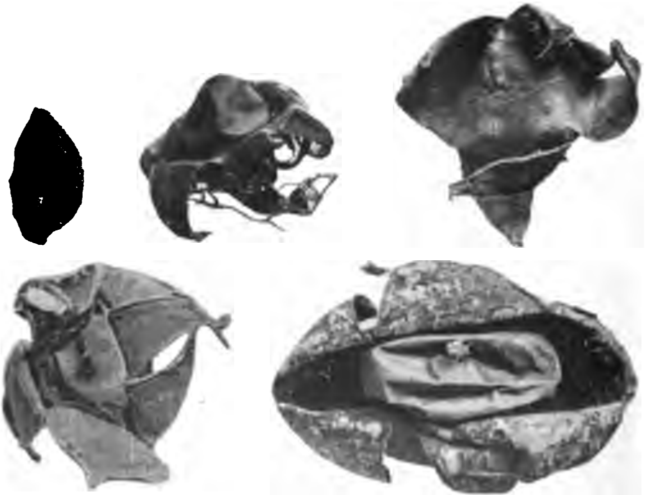
Fig. 23.

This species is a plant of world wide distribution, common in the United States. It is more rare in Europe where it is generally known as Geaster lageniformis. It seems to be the most frequent species in Australia. Of the eleven collections of Geasters we have received from that country, six belong to this one species. Numerous collections are also at Kew. Our figures (23) all made from Australian specimens, show three expanded plants, one unexpanded, and the outer view of a specimen.

Compared to the American plant, the Australian has notably larger spores and the exoperidium is not so flaccid, but we do not feel it practicable to separate them. Geaster vittatus (Grev. 9-3) is a form with exoperidium longitudinally cracked.

GEASTER CORIACEUS (Trans. N. Z. Inst. 22, 451) is a large form with a firmer exoperidium, intermediate between Geaster saccatus and G. triplex.

Geaster Guilfoylei (Sacc. 7. 472) is a synonym for G. saccatus (not for G. rufescens as stated).

Specimens in our Collection.

Australia, Grantville, J. T. Paul ; *Melbourne,* W. R. Guilfoyle (two collections); *Sydney,* R T. Baker.

New Zealand, Andover, Robt. Brown; *Christ Church,* Robert Brown.

GEASTER TRIPLEX.—Unexpanded plant acute. Exoperidium saccate, sometimes revolute. Endoperidium sessile, mouth definite.

Geaster triplex has the same characters as G. saccatus, but the typical form is so much larger that it would not be taken for the same plant. Still in the United States intermediate specimens reach me often that are difficult to refer to either. There is a specimen at Kew from Miss Carter, N. S. Wales, that I should refer to triplex. Our illustration is from the American plant.

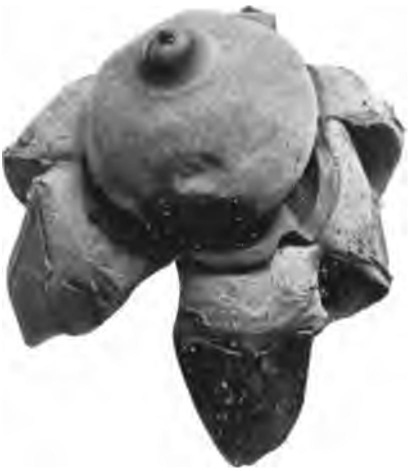

Fig. 24.

Notes on other Species attributed to Australasia.

Geaster fimbriatus is a common species of Europe, but I think grows no where else. It is close to saccatus, but has an indefinite mouth. All specimens so labeled at Kew from Australia have definite mouths and I should refer them to saccatus. Geaster australis (Flo. Tasmania 2-264), comes nearer to fimbriatus than specimens so labeled.

Geaster Speggazzinianus, I have seen no specimens so labeled from Australia, but the species from South America was based on large floriformis.

Geaster coronatus (Trans. N. Z. Inst. 16-362) I have seen no specimens and name is preoccupied.

Geaster affinis (l. c.) I do not know.

Geaster lugubris, is a synonym for Geaster mammosus but there are no specimens of this plant from Australia in museums of Europe.

Geaster pusillus (Pl. Priess 2-139). No type exists and no one knows anything about it.

THE GENUS BOVISTA.

Sterile base none. Capillitium of short, separate, branching threads. Peridium cartilaginous. papery.

The genus Bovista is a very common genus in Europe and America, but strangely rare in Australia.* The plants are typical "tumblers" breaking away from the roots when mature and rolling over the ground. The following is the only species we have seen from Australia.

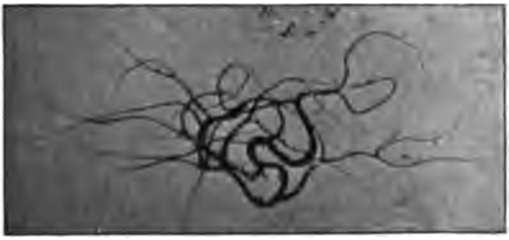

Fig. 25.

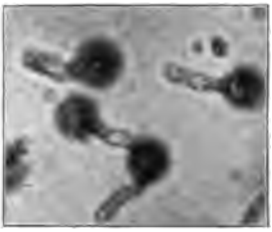

Fig. 26.

BOVISTA BRUNNEA.—Globose. Peridium *brown*, smooth, cartilaginous. Capillitium of separate threads (fig. 25). Spores globose (or slightly oval) smooth, 4–5 mic., with long slender pedicels (fig. 26).

This plant was collected in New Zealand by Colenso. Berkeley notes the close resemblance of this plant to Bovista plumbea from which it seems to differ only in the brown color of the peridium, not a very good specific character.

THE GENUS MYCENASTRUM.

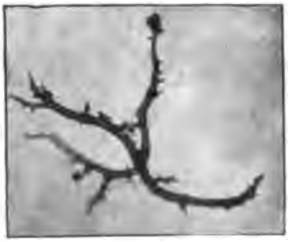

Fig. 27.

This genus is characterized by the globose form, thick peridium and absence of sterile base. The threads of the Australian species are short, separate and furnished with little spiny points (fig. 27.) No other known puff-ball has a similar capillitium.†

MYCENASTRUM CORIUM (Fig. 28) Peridium thick, hard, almost woody. It varies in thickness from one to four millimeters. When young the cortex is smooth or with a felty appearance, but it dries up and disappears in the very old specimens. Often it cracks in areas as shown in our fig. 28.

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* Of the seven species given in Cooke's Handbook, five are Catastomas and one a Calvatia. The apparent absence from the Australian flora of Bovista plumbea, nigrescens and pila, the three common species of America and Europe, also of Lanopila bicolor a similar plant of the tropics, seems remarkable.

† But whether it is advisable to limit the genus to this one species on this character is not assured.

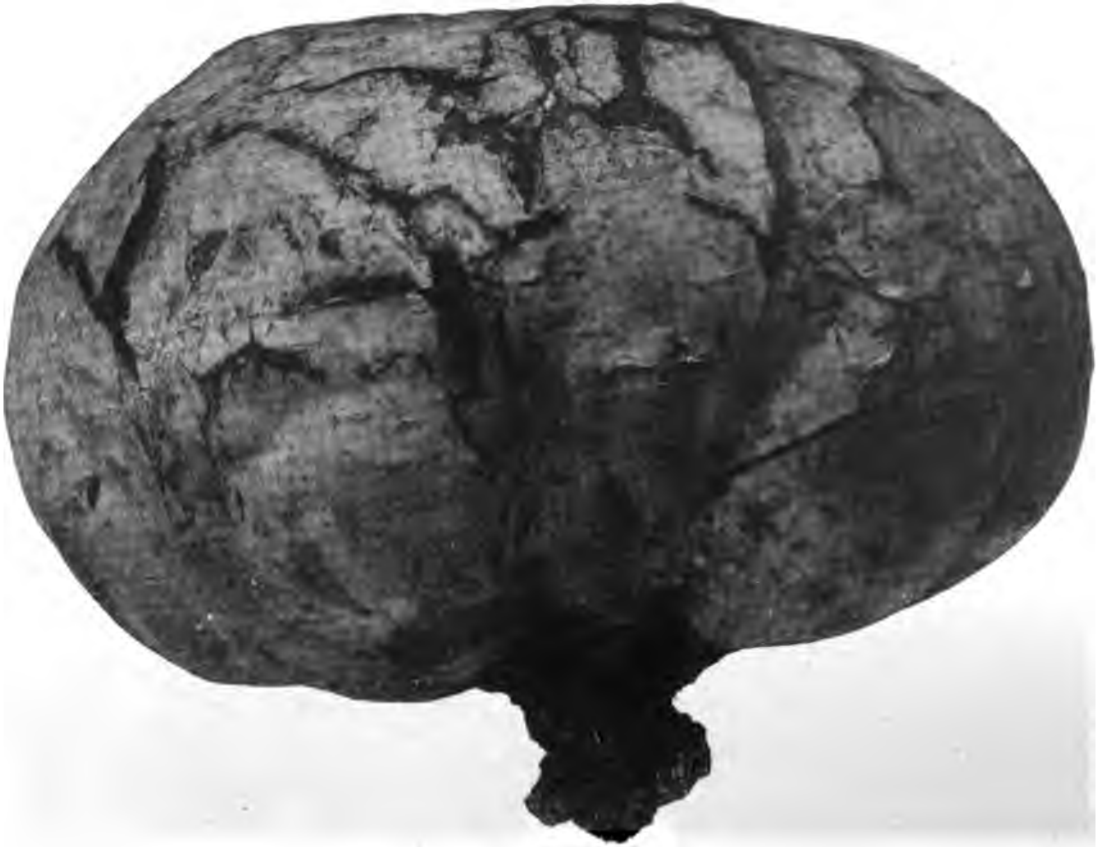

Fig. 28.—Mycenastrum Corium.

The gleba first turns bright olive,* finally dark purplish brown. Capillitium of peculiar, short, pointed threads, bearing little spiny points. Spores (fig. 29) globose, large, 8–10 mic. warted.

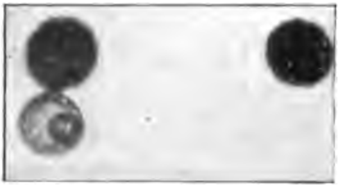
Fig. 29

This plant is of wide distribution in the world, and on sandy plains often occurs in the greatest abundance. It has received a large number of synonyms of which Mycenastrum olivaceum and Mycenastrum phaeotrichum (see foot note, *) have been applied to Australian specimens. They are compiled in Saccardo as Scleroderma olivaceum and Scleroderma phaeotrichum.†

Specimens in our Collection.

New Zealand, *Andover*, Robert Brown.

Australia, *Warracknabeal*, F. M. Reader, *Norwood*, J. G. O. Tepper.

Melbourne, W. R. Guilfoyle.

THE GENUS CATASTOMA.

Plants globose without sterile base. Exoperidium usually thick and breaking away from the inner peridium excepting a small portion which generally remains as little cup at the base.‡ Capillitium (Fig.30)§ of short, simple, unbranched threads, which is *the character* of the genus. Spores globose, more or less rough, sometimes pedicellate.

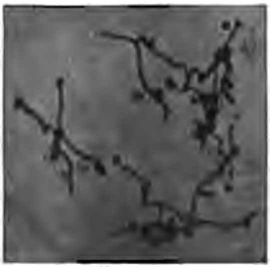
Fig. 30.

Australia is rich in this genus and of the four species, three are known, each from a single collection and only known from Australia. The gleba colors vary much but we would not place too much stress on a character drawn from one collection.

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*If specimens are collected when the gleba is in the olive condition, it retains this color. Mycenastrum olivaceum (Grev. 18-83) is based on such specimens. Mycenastrum phaeotrichum (Hook. Jour. 48-48) originally referred to Mycenastrum Corium by Berkeley, was afterwards separated by him because the gleba color did not correspond to that of the specimens received from Paris. The plant is the same in other particulars, and the gleba color of any particular specimen is of no importance.

†Of the many changes in plant names that are made in compiling in Saccardo, none perhaps have less merit than the system which still persists of compiling Mycenastrum as Scleroderma. The two genera are widely different. And when Bovistellas are described as Mycenastrums, as they have been, to compile them as Sclerodermas reaches the limit, for of the characters on which genera are based these two have not a single one in common.

‡The original American species have a very peculiar structure (see Myc. Notes p. 121). When the plant is mature the outer peridium breaks in a somewhat circumscissal manner, part remaining as a cup in the ground and part remaining attached to the inner peridium as a kind of cup. The inner peridium with this cup at the top becomes loose and is rolled over the surface of the ground. It opens by a little mouth *opposite* the portion to which the cup is attached, hence that part of the inner peridium which is the base of the growing plant. Most species of Catastoma have a small portion of the exoperidium attached to the specimen as collected but that they all grow in this way is not assured. Catastoma anomala *does not* as I have had an opportunity to observe in some fine specimens sent me by R. T. Baker.

§The genus Catastoma is of wide distribution, and is most strangely distinct from Bovista in its capillitium characters (cfr. figs. 25 and 30). The genus was universally overlooked by European writers on puff balls until it was pointed out by Morgan an American mycologist. Then it was at once adopted by all recent European writers and one of them (Hollos) has tried to steal it by the trickery of name jugglery.

Gleba olive,	Catastoma hypogaeum,
“ umber,	“ anomalum,
“ reddish,	“ Muelleri,
“ purplish,	“ hyalothrix,

CATASTOMA HYPOGAEUM (Plate 32, fig. 1, 2 and 3).—Exoperidium rather thin, breaking irregularly (in these specimens mostly attached). Endoperidium thin, yellowish. Gleba bright olive. Spores small. 6 mic, rather strongly rough. Capillitium colored, simple curled threads.

Type Specimen (Bovista hypogaea, Grev. 20-35) at Kew from Mrs. Martin, Gippsland.

Specimens in our Collection.

Christ Church, New Zealand, Robert M. Laing. The gleba are not so bright olive as the types at Kew but the plant is in every other respect the same.

CATASTOMA ANOMALUM (Plate 32, fig. 4, 5 and 6).—Exoperidium very thin, breaking irregularly. Endoperidium rich brown, with a strong protruding mouth (like Tylostoma mammosum). Gleba dark umber. Spores globose, very slightly rough, 6-7 mic. not pedicellate. Capillitium light colored, curled, simple.

This unique little species is distinguished by the protruding mouth such as no other known species has. Type at Kew (Bovista anomala Grev. 18-6) from Mrs. Martin, Victoria, specimens also "Gippsland" and "Delatite River, Rev. R. Thom" at Kew. The same species is found in Berkeley's Herbarium, from St. Domingo and I have seen what I take for the same species at Berlin from Africa. The specific name anomala was quite appropriate to it when described as a "Bovista" for it is an anomalous Bovista, but as a Catastoma, the name would be better if it were "typicum".

Specimens in our Collection.

Rockwood Australia, R. T. Baker.

CATASTOMA MUELLERI (Plate 32, fig. 7 and 8).—Exoperidium thin, reddish, sub-persistent. Endoperidium thin, reddish. Gleba reddish umber. Spores large 10 mic. *very* rough, without pedicels. Capillitium light colored.

This species has the largest, roughest spores of any known. It is close to Catastoma Zeyheri of Africa but has a different exoperidium.

Type at Kew (Bovista Muelleri Linn. Jour, 13-171), from Herbert's Creek, Queensland, E. M. Bowman.

CATASTOMA HYALOTHRIX (Plate 32, fig. 9, 10 and 11).—Exoperidium thick, in the nature of a sand case, usually partly adherent but when peeling off leaving a scar on the endoperidium. Endoperidium dark purplish. Gleba purplish. Spores about 10 mic. rough, with a pedicel about as long. Capillitium simple, curled, light colored, (not "hyaline").

Type at Kew (Bovista hyalothrix Grev. 16-73) from C. French, Lake Allacutya. The plant is very close to Catastoma castaneum, from Africa, (type in Museum at Paris) as to color, and peridium characters, but spores are larger, (5-7 mic. in African plant). I think however they are forms of one species.

Note.—Lycoperdon bovistoides (Bull Soc. Myc. 89-118) seems from the illustration to be a Catastoma but the "sterile base" removes it from this genus. We have seen no specimen.

THE GENUS BOVISTELLA.

Peridium flaccid, opening by a definite mouth. Sterile base usually well developed, sometimes very slightly or not at all. Capillitium of separate branched threads, or of threads with pointed branches. Spores pedicellate.

We would extend the limits of this genus as above for reasons that will be discussed more fully when we consider the genus in Mycological Notes. As we should define the genus it includes all plants heretofore classed as Lycoperdons which have pedicellate spores. As thus defined it includes four known Australian species. The original definition of the genus based on a single species requires that the capillitium threads should be "free" and separate. Neither of these four species under this definition is included in the genus.*

BOVISTELLA ASPERA (Plate 33, fig. 6, 7, 8, 9 and 10.—Peridium subglobose with a strong tap root. Cortex of short. thick spines converging in fours, when old, largely falling away leaving the peridium furfuraceous. Sterile base none or very slightly developed.† Gleba olive. Capillitium long, branched threads running out to points. Spores globose, smooth, 4-5 mic. with thin pedicels 8-10 mic.

There are specimens at Kew collected by Mueller at Haidinger Range in 1861. We have also received a collection from W. W. Watts, Sydney. The plant was originally described from Chili (Bovista aspera Ann. Sci. Nat. 3-5-162).

Specimens in our Collection.

Sydney Australia, W. W. Watts.

BOVISTELLA AUSTRALIANA Plate 33, fig. 1, 2, 3, 4 and 5).—Plant with a well developed sterile base of large cells. Cortex minute, nodular, furfuraceous. Peridium becoming smooth when old. Gleba olive umber. Capillitium long branching threads with pointed branches. Spores globose, smooth, 4 mic. with slender pedicels 12-15 mic.

This is a small species with strong tap root. The shape varies from subglobose to somewhat elongated as shown in our plate. There is a corresponding variance in the development of the sterile bases.

Specimens in our Collection.

Grantville Australia, J. T. Paul. *Andover*, *New Zealand*, Robt. Brown.

BOVISTELLA GLABESCENS—Plant with a well developed sterile base of small cells. Smooth (now, but probably had a prominent cortex.) Gleba olive umber. Capillitium long, intertwined, branched, with pointed branches. Spores globose 5 mic. smooth, with slender pedicels One collection at Kew from Tasmania. Described as Lycoperdon glabescens (Flo. Tasm. 2, 264).

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*On page 85 Mycological Notes we considered the separate or attached threads as the essentials of the genus Bovistella to distinguish it from Lycoperdon, but since studying many plants of this group we conclude that the pedicellate spores are the only practical distinction to be drawn.

†The type specimens at Paris have no sterile bases, but specimens we have received from Australia, surely the same plant, have a *very slight* development not over 2 mm. thick.

PLATE 25

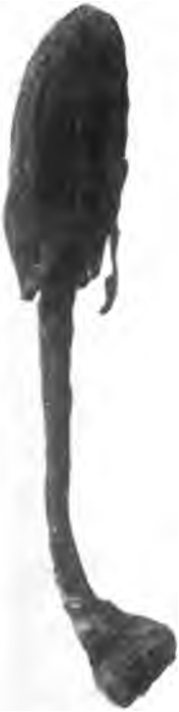


Fig. 1.

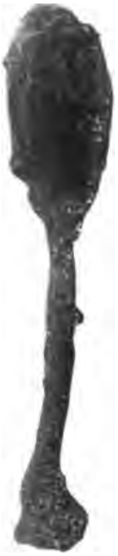


Fig. 2.

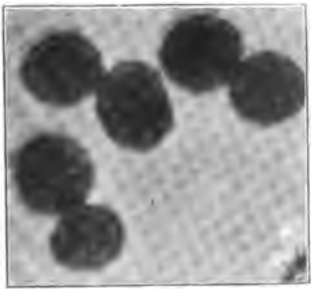


Fig. 3.

Explanation of Figures.

Fig. 1 and 2. Plants from R. T. Baker. Sydney, Australia. Figure 3. Spores (x 1000).

PODAXON AEGYPTIACUS.

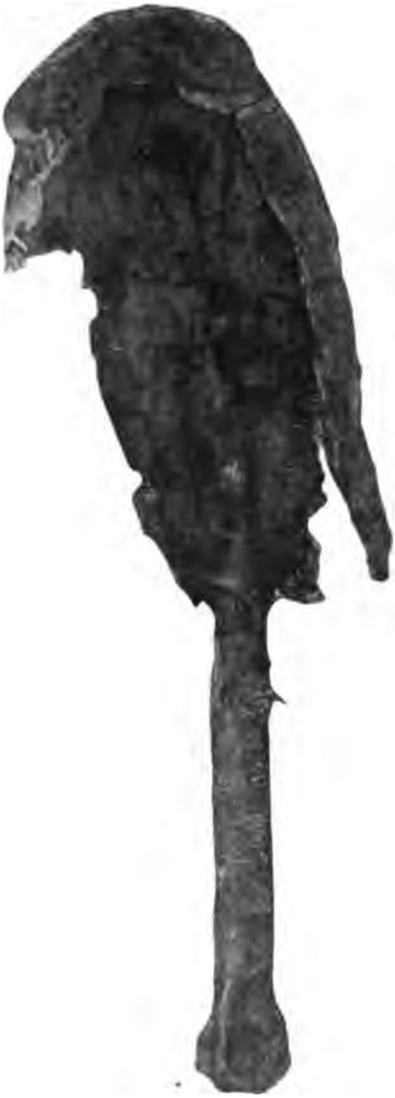


Fig. 4.

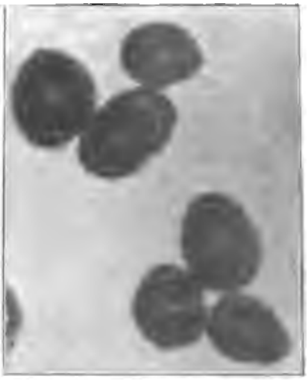


Fig. 5.

Explanation of Figures.

Fig. 4. Plant in Museum at Berlin. Figure 5. Spores (x 1000).

PODAXON MUELLERI.

PLATE 26.

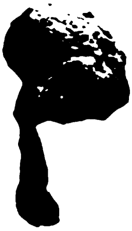


Fig. 1.

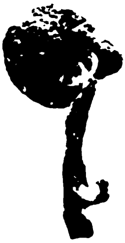


Fig. 2.

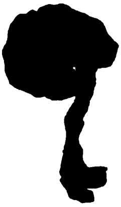


Fig. 3.

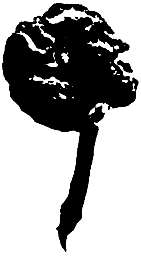


Fig. 4.

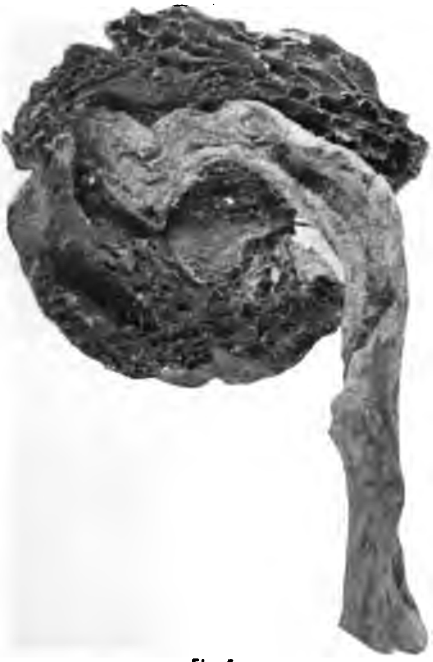


Fig. 5.

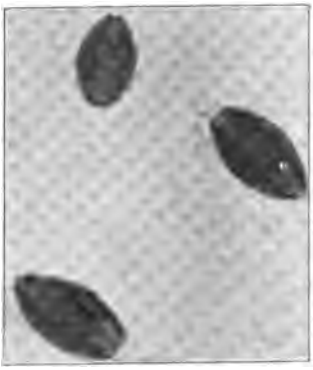


Fig. 6.

Explanation of Figures.

Figs. 1, 2, 3 and 4. Plants from Robt. Brown, New Zealand. Figure 5. A section enlarged fourfold. Figure 6. Spores (x 1000).

SECOTIUM ERYTHROCEPHALUM.

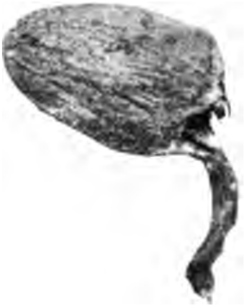


Fig. 7.

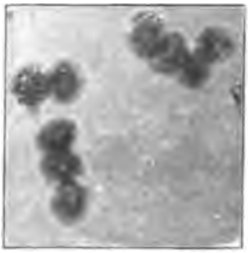


Fig. 8.

Explanation of Figures.

Fig. 7. Plant from W. H. Long, Jr. Texas, U. S. A. Fig. 8. Spores (x 1000).

SECOTIUM COARCTATUM.

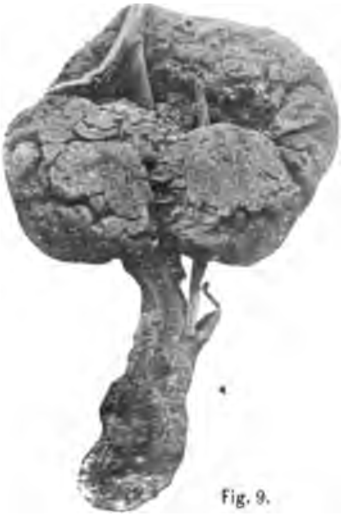


Fig. 9.

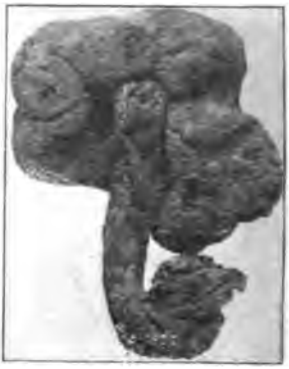


Fig. 10.

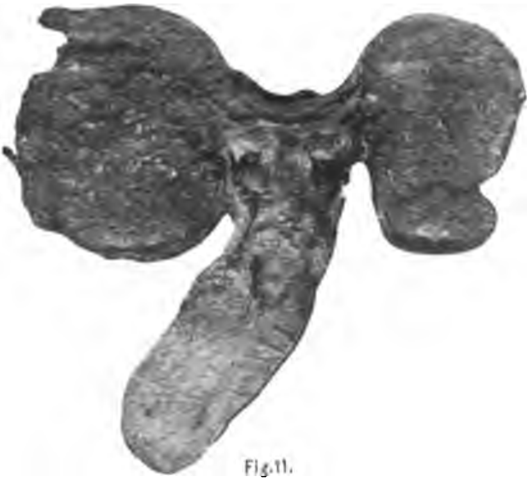


Fig. 11.

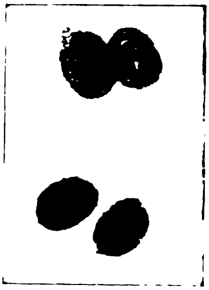


Fig. 12.

Explanation of Figures.

Fig. 9 and 10. Type specimens at Kew. Fig. 11. Section. Fig. 12. Spores (x 1000).

SECOTIUM MELANOSPORUM.

PLATE 27

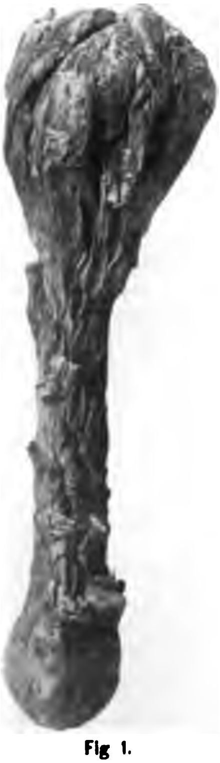


Fig 1.

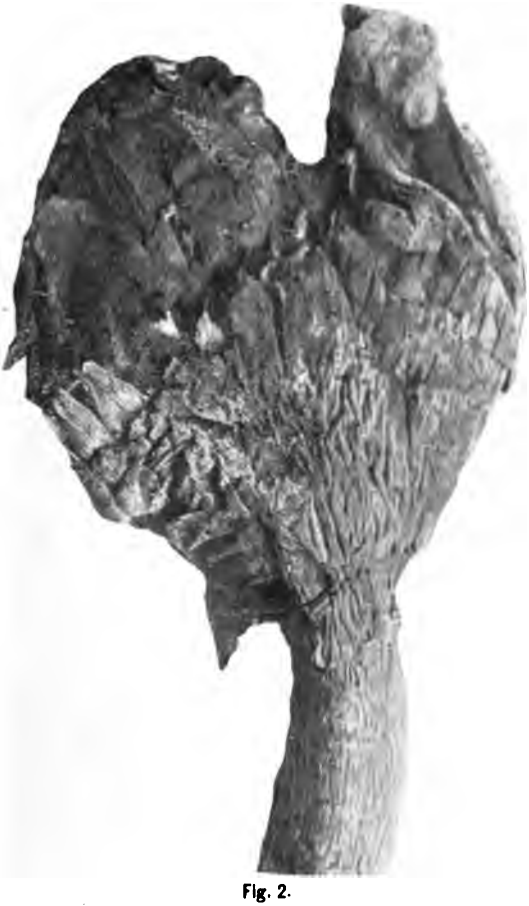


Fig. 2.

Explanation of Figures.

Fig. 1. Plant from Algiers sent by A. Acloque, France. Fig. 2. Specimen at Kew from Australia. (Two inches of the stipe of the specimen is cut off from this figure).

PHELLORINA DELASTREI.

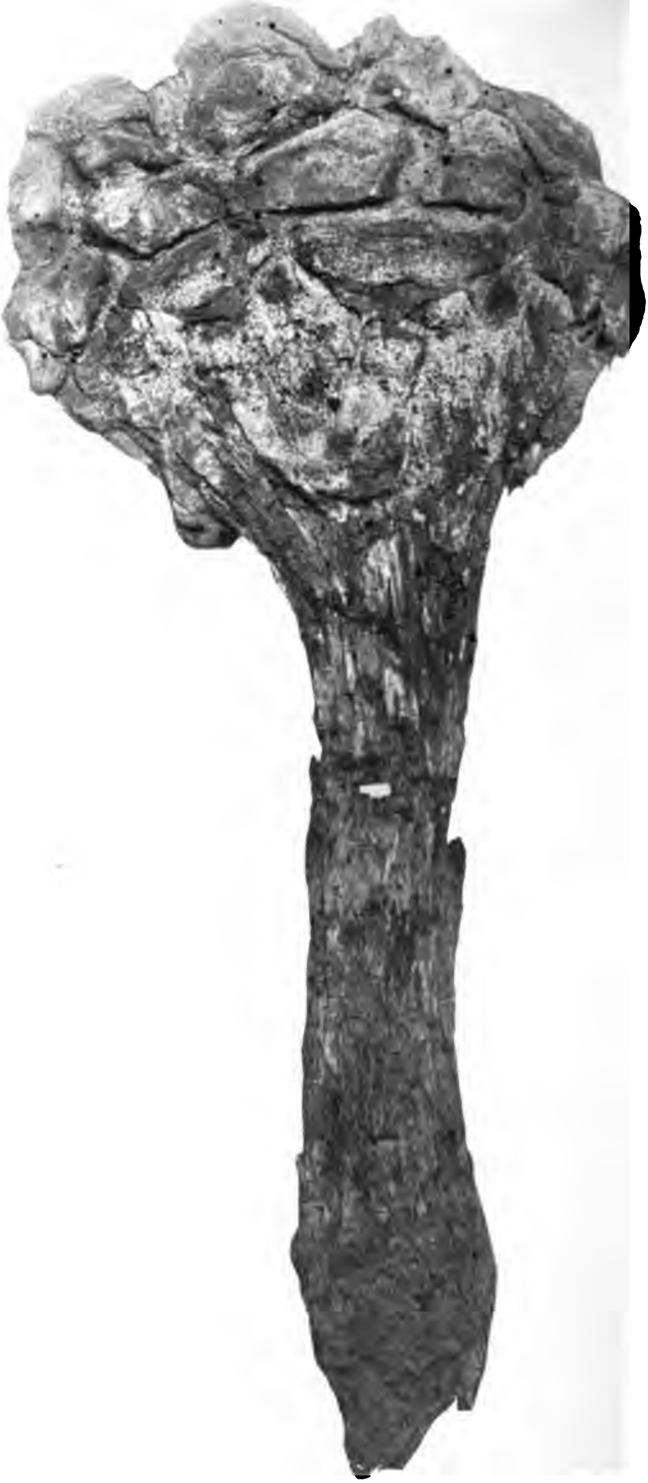


Fig 3.

Explanation of Figure.

Fig. 3. Type Specimen in Museum at Berlin.

PHELLORINA STROBILINA.

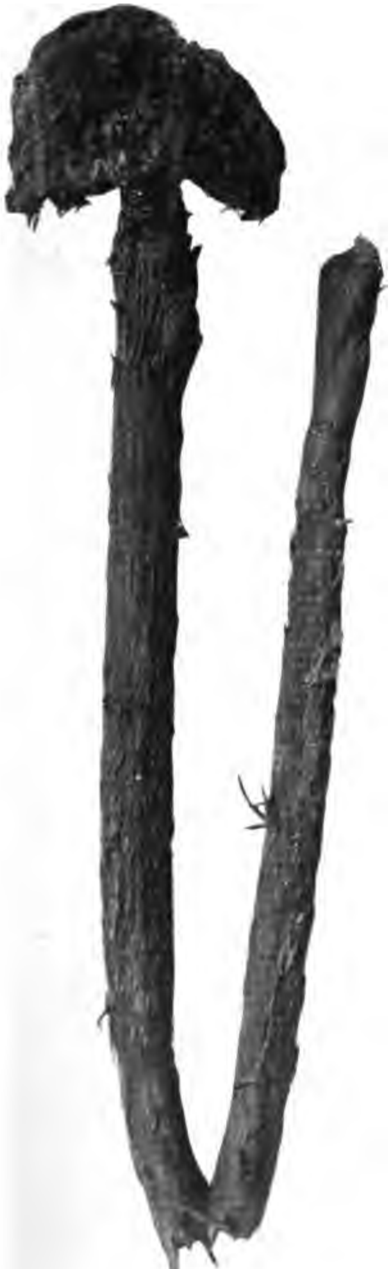


Fig. 1.

Explanation of Figure.

Fig. 1. Specimen from L. A. Greata, California.

BATTARREA PHALLOIDES.

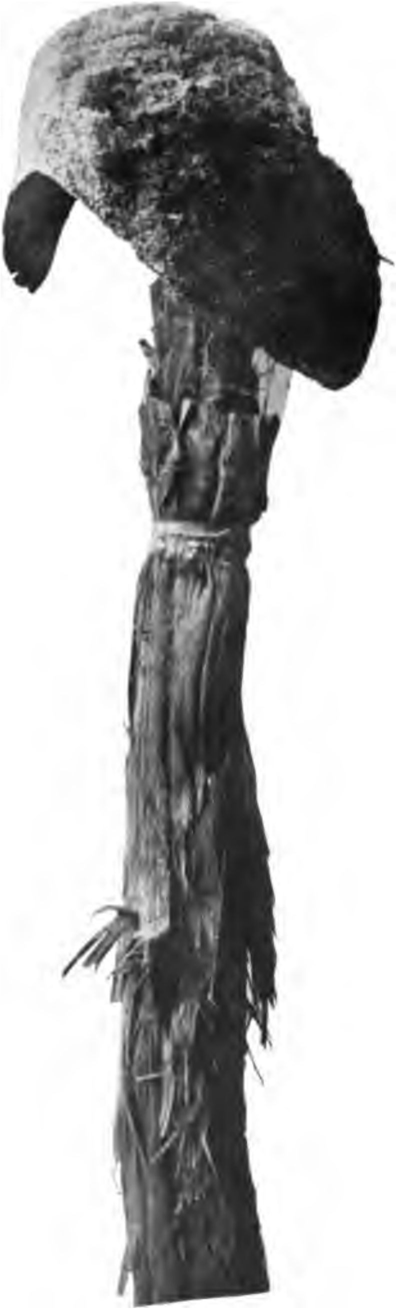


Fig. 2.

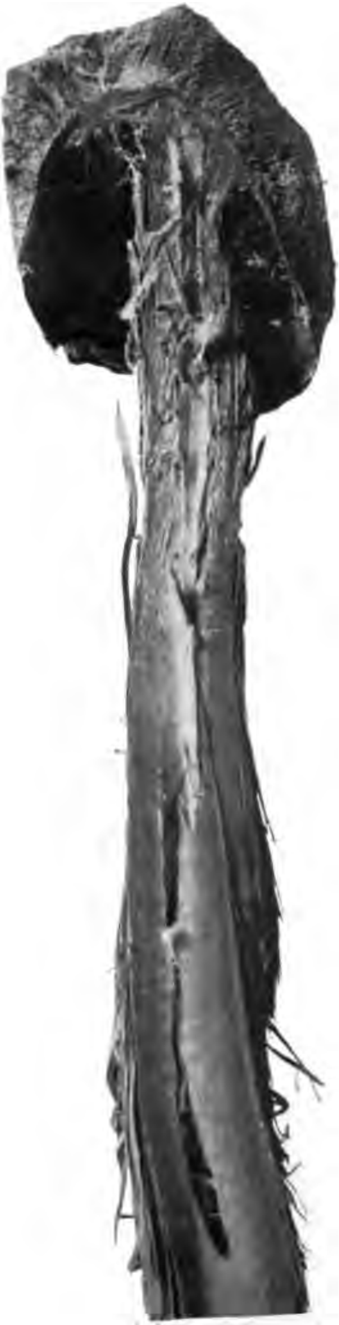


Fig. 3.

Explanation of Figures.

Fig. 2. Plant from L. G. Yates, California. Fig. 3. Section of same.

BATTARREA STEVENII.

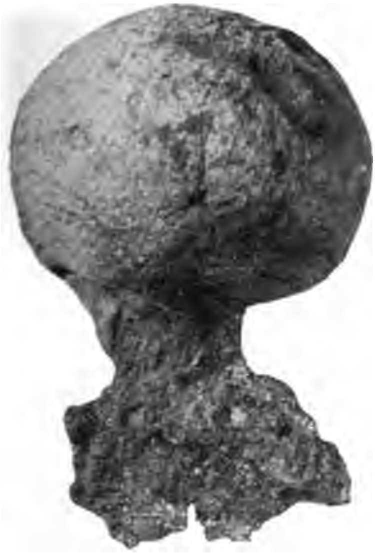


Fig. 1.

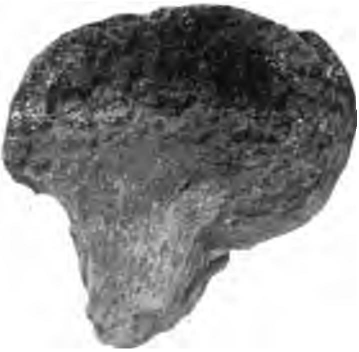


Fig. 2.

Explanation of Figures.

Fig. 1. Plant from New Caledonia, (from P. Hariot, Paris). Fig. 2. Plant from Walter Gill, Australia.

POLYSACCUM PISOCARPIUM

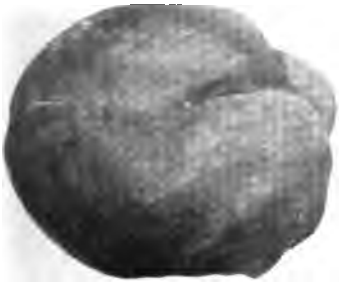


Fig. 5.

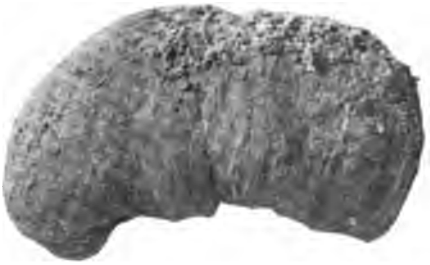


Fig. 6.

Explanation of Figures.

Fig. 5. Plant from Saxony in Museum at Berlin. Fig. 6. Plant from J. T. Paul, Australia.

POLYSACCUM TUBEROSUM.

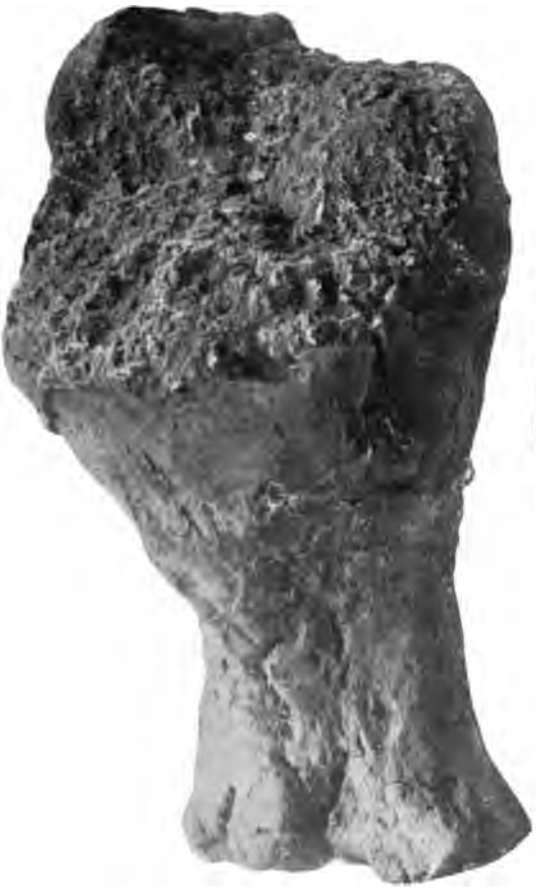


Fig. 3.

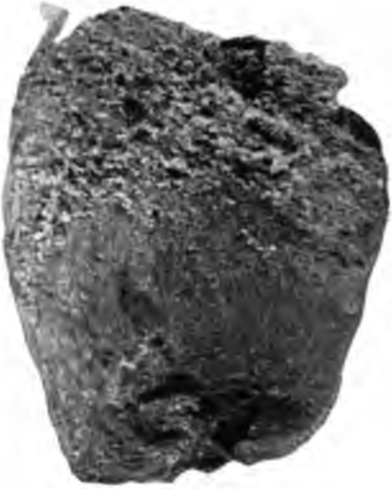


Fig. 4.

Explanation of Figures.

Fig. 3. Plant from L. G. Yates, California. Fig. 4. Plant from R. T. Baker, Australia.

POLYSACCUM CRASSIPES.

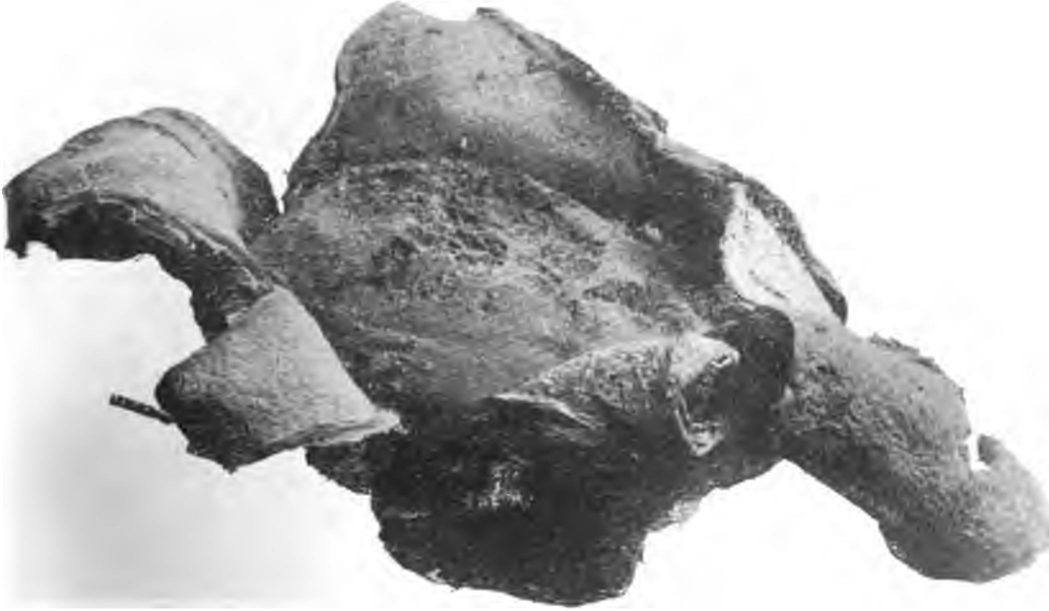


Fig. 1.

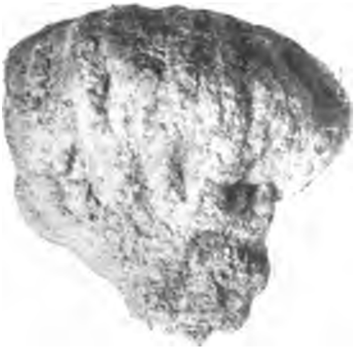


Fig 2.

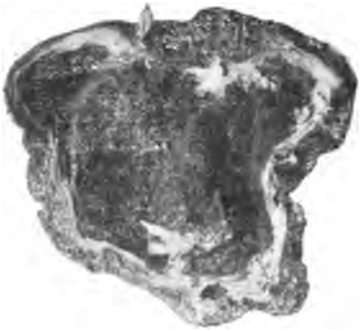


Fig. 3.

Explanation of Figures.

Fig. 1. Mature specimen from A. P. Morgan, Ohio. Fig. 2. Young (unopened) specimen from Simon Davis, Massachusetts. Fig. 3. Section of same.

SCLERODERMA GEASTER.

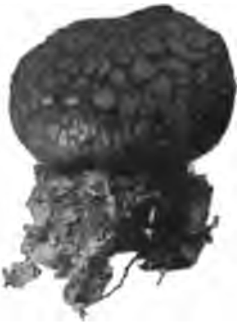


Fig. 4.

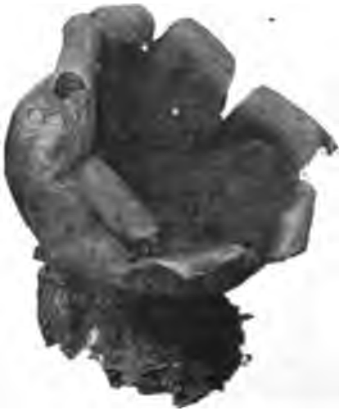


Fig. 5.

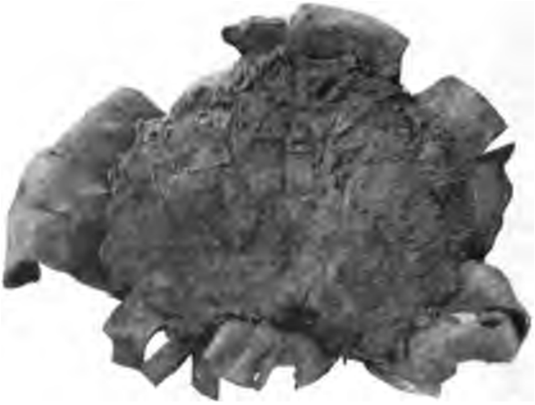


Fig 6.

Explanation of Figures.

Fig. 4. Unopened plant from J. B. Ellis, New Jersey. Fig. 5. Same opened. Fig. 6. Specimen from W. R. Guilfoyle, Australia.

SCLERODERMA FLAVIDUM.

PLATE 31.

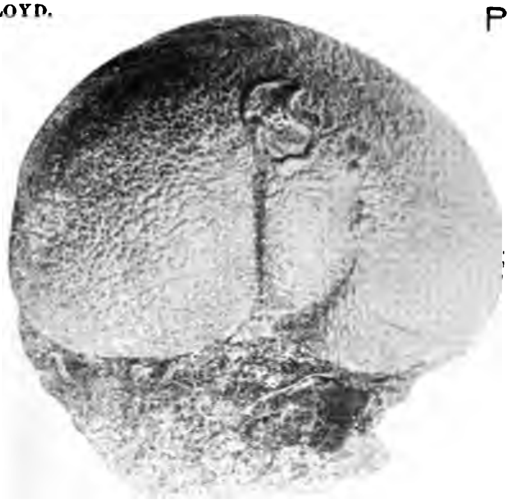


Fig. 1.

Explanation of Figure.

Fig. 1. Specimen from Steve C. Stuntz, Wisconsin.

SCLERODERMA CEPA.

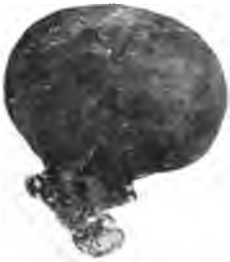


Fig. 2.

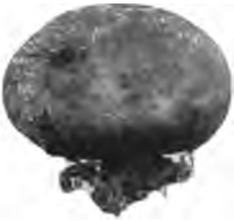


Fig. 3.

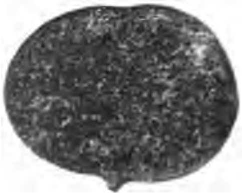


Fig. 4.

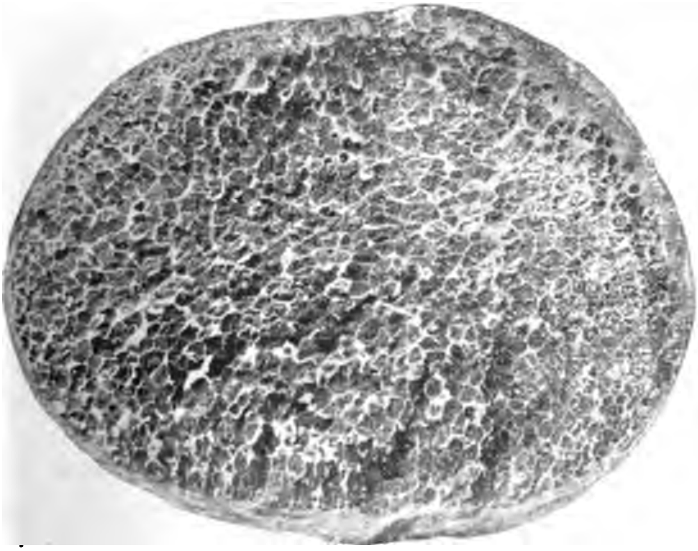


Fig. 5.

Explanation of Figures.

Fig. 2 and 3. Plant collected at Cincinnati. Fig. 4. Section of same.
Fig. 5. Section enlarged threefold to show the permanent cells.

SCLERODERMA TEXENSE

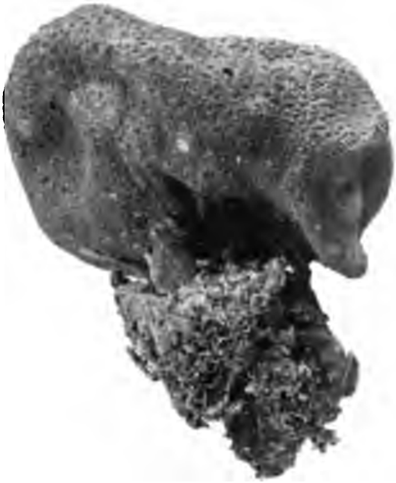


Fig. 6.

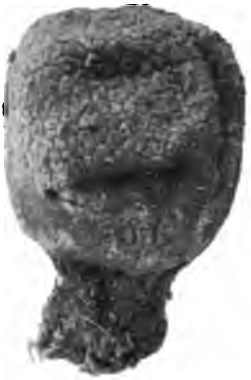
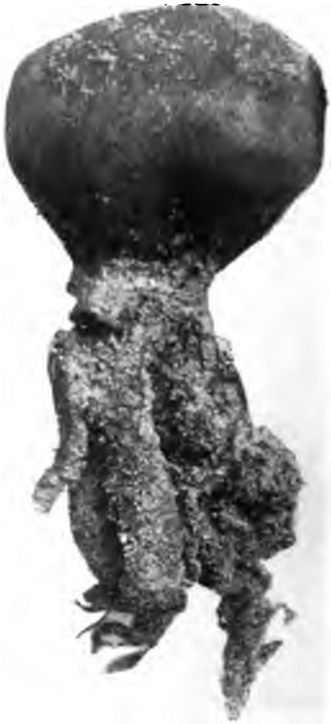


Fig. 7.

Explanation of Figures

Fig. 6 and 7. Plants from Dr. Wm. Herbst, Pennsylvania.

SCLERODERMA AURANTI~~AC~~UM.



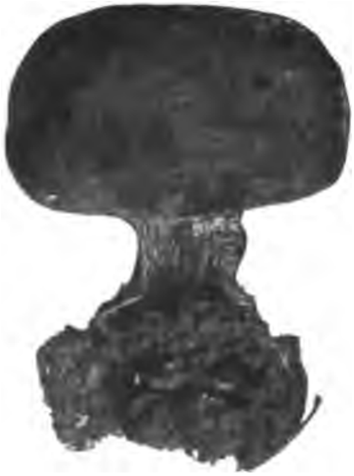


Fig. 8.

Fig. 9.

Explanation of Figures.

Fig. 8. Plant from Charles Crossland, England. Fig. 9. Plant from Simon Davis, Massachusetts.

SCLERODERMA VERR~~N~~uCOSUM.

PLATE 32.

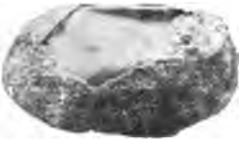


Fig. 1.

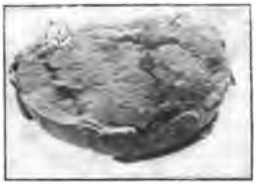


Fig. 2.

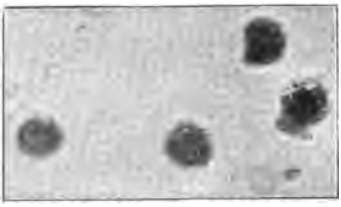


Fig. 3.

Explanation of Figures.

Fig. 1. Specimen at Kew, Fig. 2. Section of same. Fig. 3. Spores (x 1000).

CATASTOMA HYPOGAEUM.

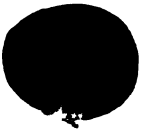


Fig. 4.

Fig. 5.

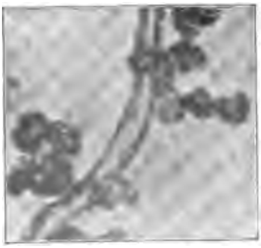


Fig. 6.

Explanation of Figures.

Fig. 4. Specimen from R. T. Baker, Australia. Fig. 5. Section. Fig. 6. Spore (x 1000).

CATASTOMA ANOMALUM.

Fig. 7.

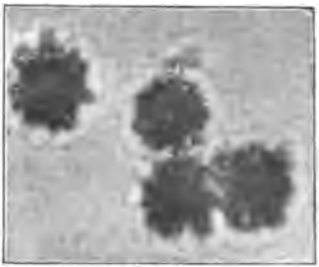


Fig. 8.

Explanation of Figures.

Fig. 7. Type Specimen at Kew. Fig. 8. Spores (x 1000).

CATASTOMA MUELLERI.

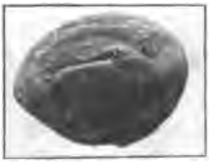


Fig. 9.

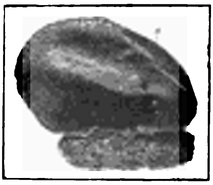


Fig. 10.

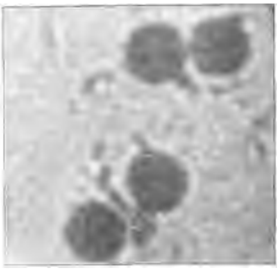


Fig. 11.

Explanation of Figures.

Fig. 9. Type specimen at Kew. Fig. 10. Section. Fig. 11. Spores (x 1000).

CATASTOMA HYALOTHRIX.

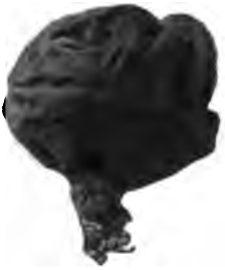


Fig. 1.

Fig. 2.

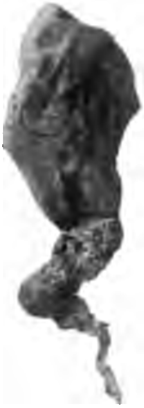


Fig. 3.

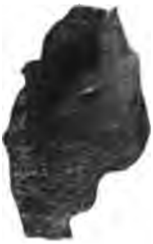


Fig. 4.

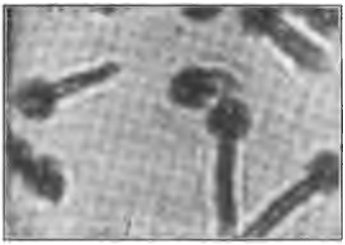


Fig. 5.

Explanation of Figures.

Specimens from J. T. Paul, Australia. Fig. 5. Spores (x 1000).

BOVISTELLA AUSTRALIANA.

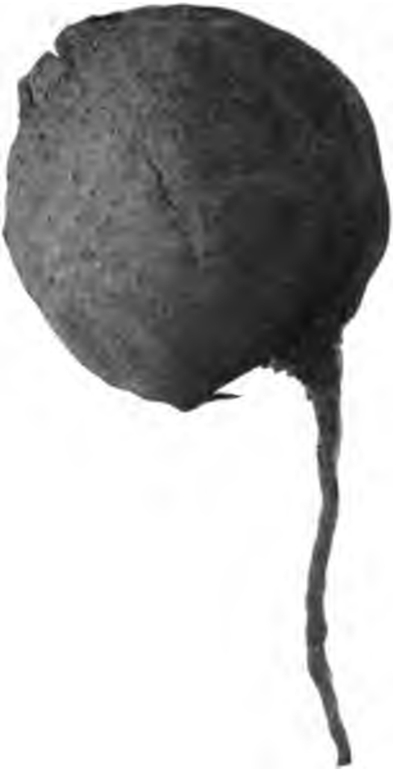


Fig. 6.

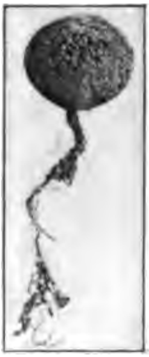


Fig. 7.

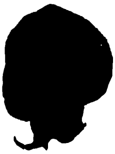


Fig 8.

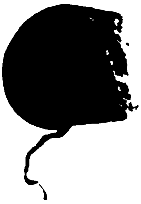


Fig. 9.

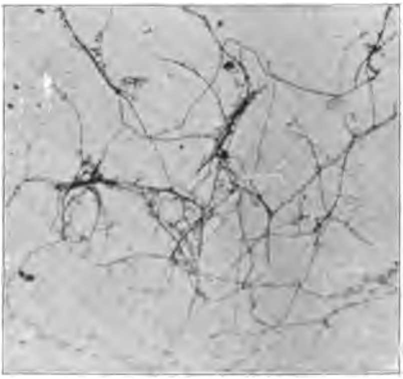


Fig. 10.

Explanation of Figures.

Fig. 7. Type in Museum at Paris. Fig. 8 & 9. Specimens from W. W. Watts. Sydney, Australia. Fig. 6. Plant enlarged 4 times. Fig. 10. Capillitium (x 100).

BOVISTELLA ASPERA.

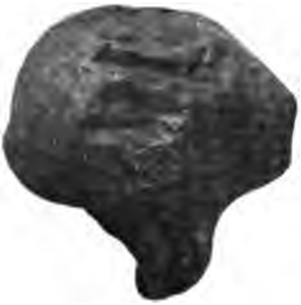


Fig. 1.

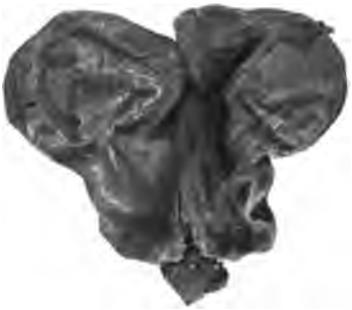


Fig. 2.

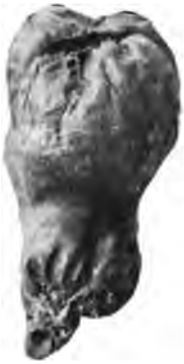


Fig. 3.

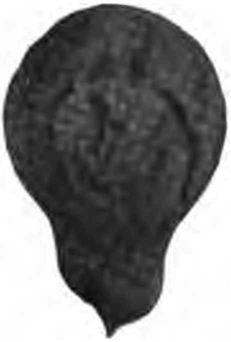


Fig.4.

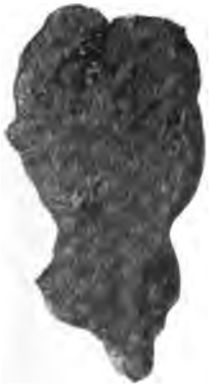


Fig. 5.

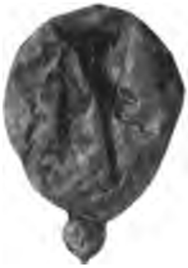


Fig. 6.

Explanation of Figures.

Fig. 1 and 2. Plants from W. R. Guilfoyle, Australia. Fig. 3, 4, 5 and 6. Plants from Miss Jessie Dunn, New Zealand.

LYCOPERDON POLYMORPHUM.

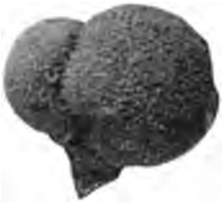


Fig. 7.

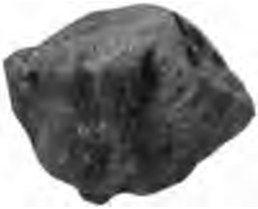


Fig. 8.

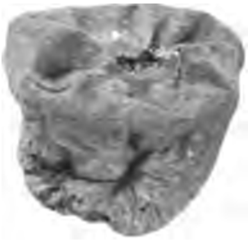


Fig. 9.

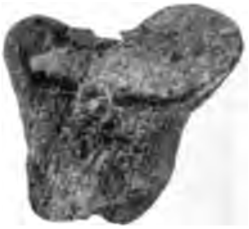


Fig. 10.

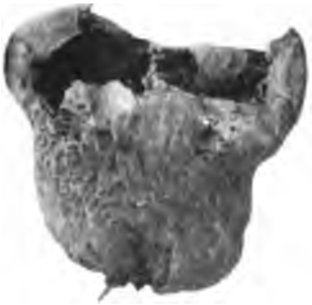


Fig. 11.

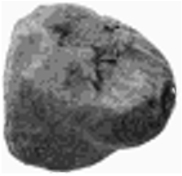


Fig. 12.

Explanation of Figures.

Fig. 7. Young plant with cortex. Fig. 8, 9, 10, 11 and 12. Mature plants Fig. 10. Section. All from Robert Brown, New Zealand.

LYCOPERDON PRATENSE.

PLATE 35.

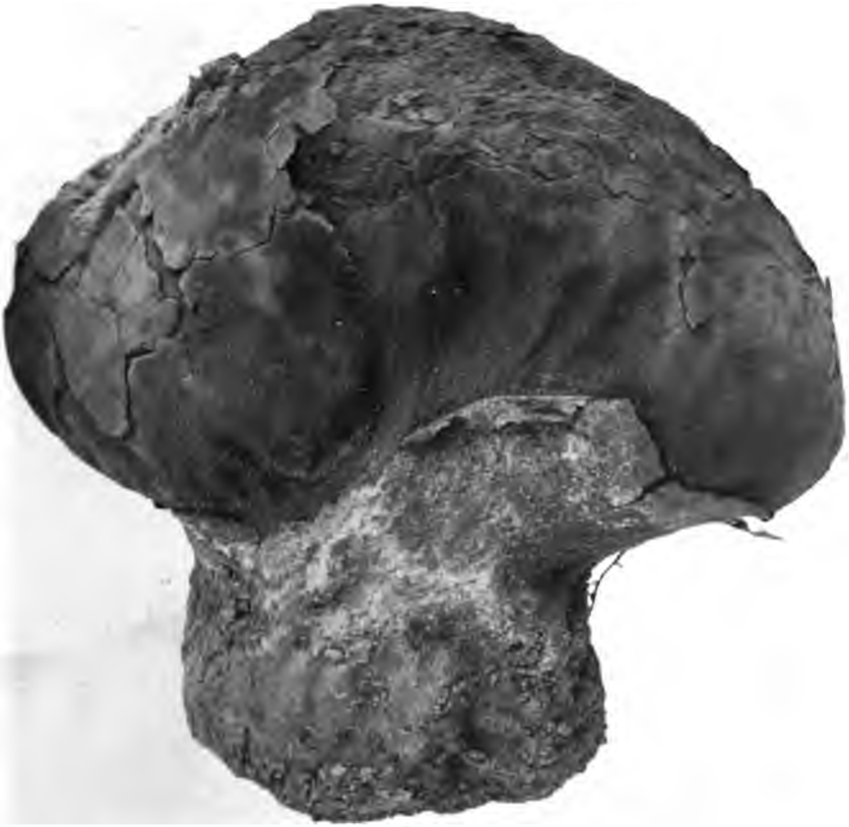


Fig. 1.

Explanation of Figure.

Mature plant from vicinity of Cincinnati, Ohio.

CALVATIA LILACINA.

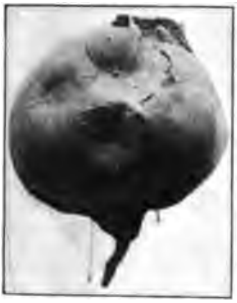


Fig. 2.

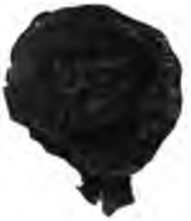


Fig. 3.

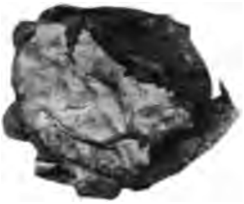


Fig. 4.

Explanation of Figures.

Fig. 2. Specimen from J. G. O. Tepper, Australia. Fig. 3. Plant in Museum at Berlin. Collected by Dr. Hennings, near Berlin. Fig. 4. Plant from Dr. Hollos, Hungary.

CALVATIA CANDIDA.

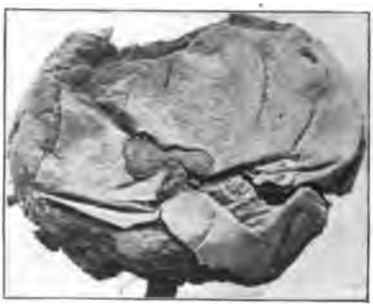


Fig. 5.

Explanation of Figure.

Fig. 5. From type specimen at Kew.

CALVATIA OLIVACEA.

Issued by C. G. LLOYD.

PLATE 36.

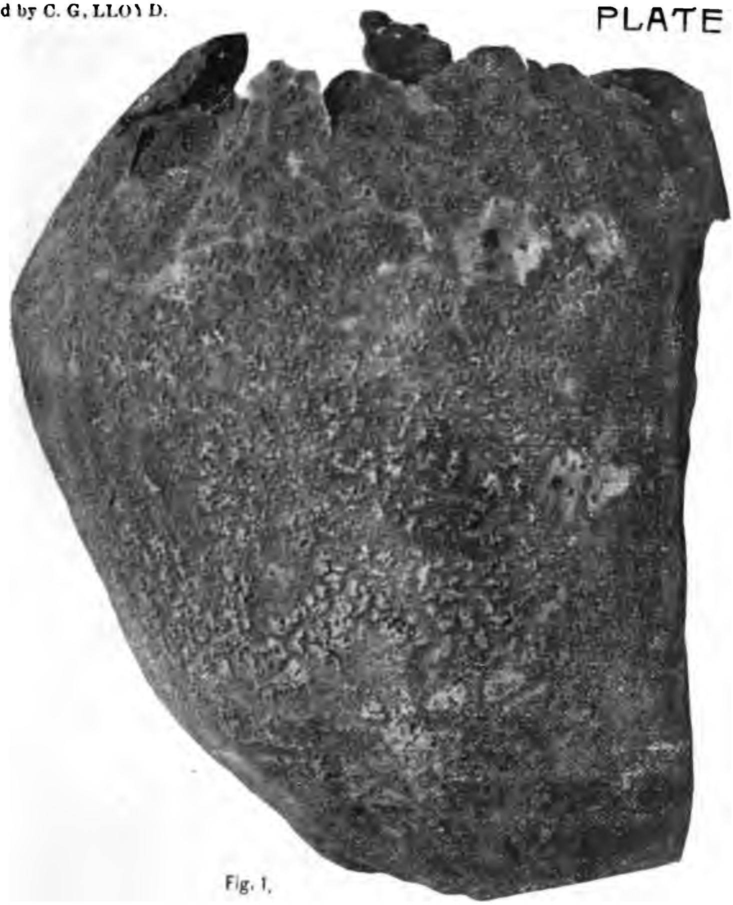


Fig. 1.

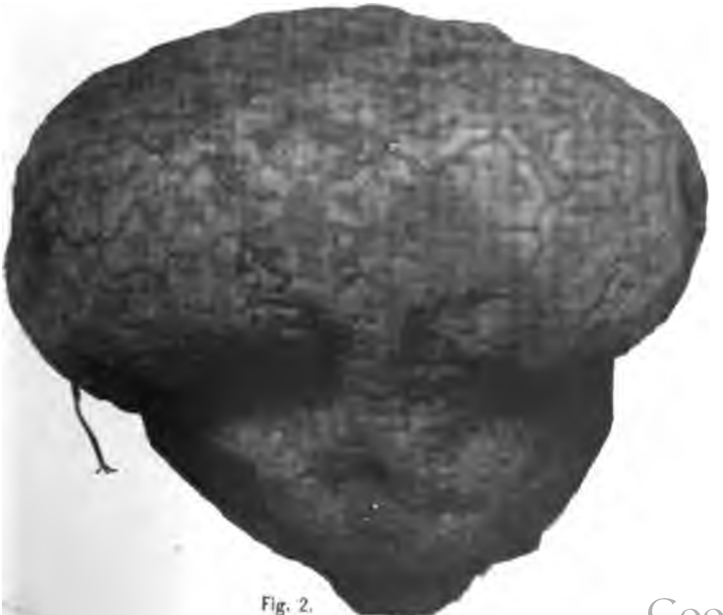


Fig. 2.

CALVATIA CAELATA.

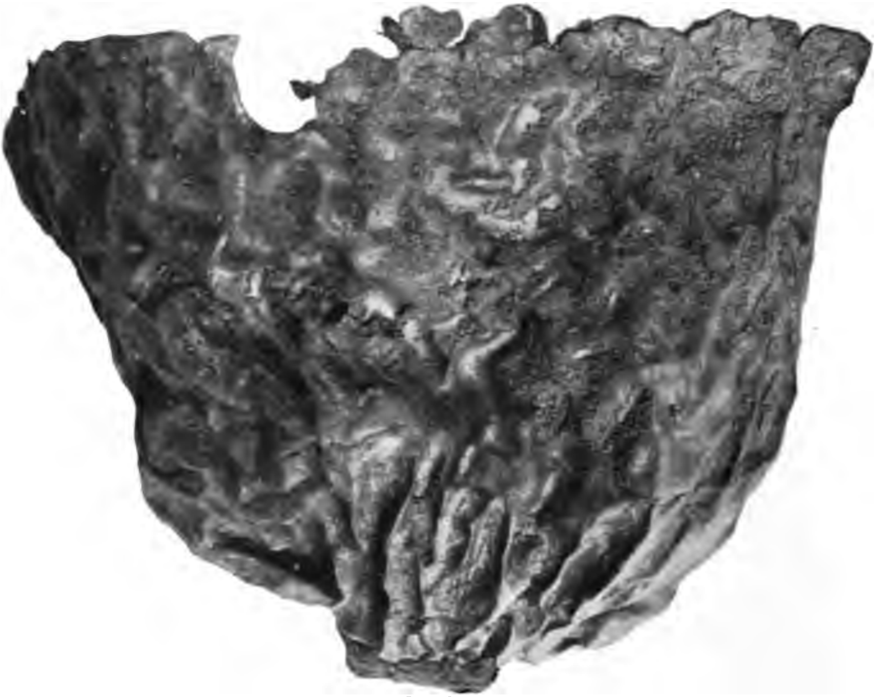


Fig. 3.

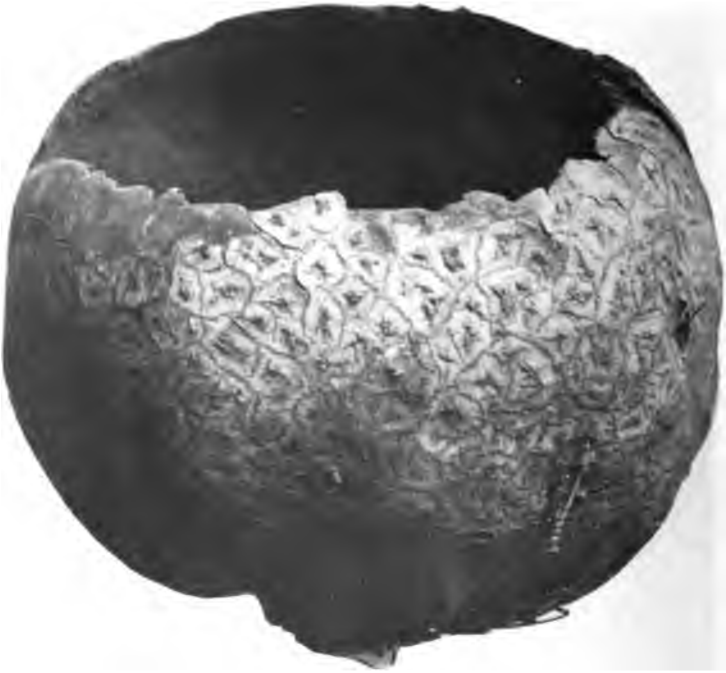
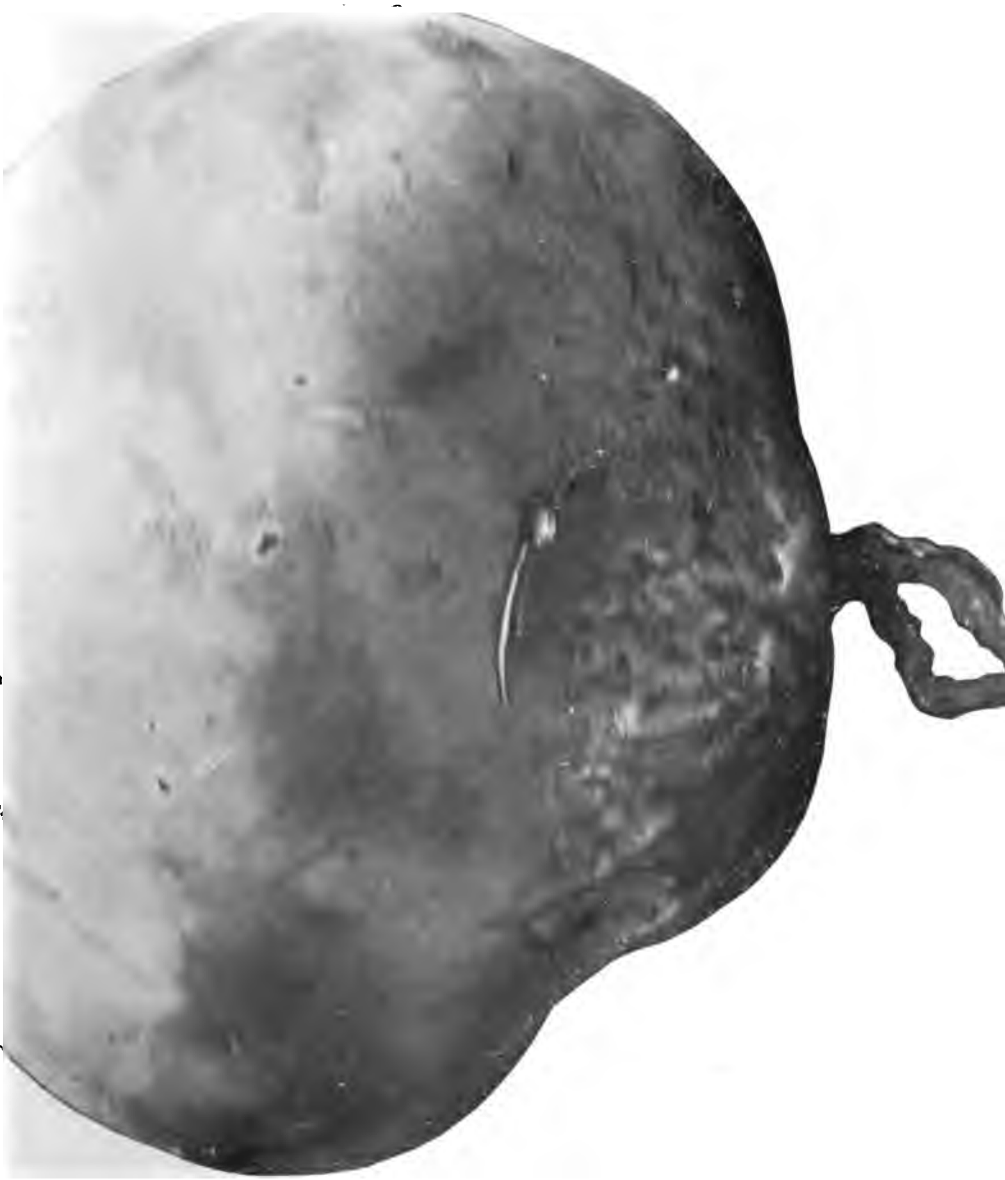


Fig. 4.

Fig. 1. Plant from T. de Aranzadi, Spain. Fig. 2. Plant from E. Bartholomew, Kansas. Fig. 3. Plant from Robert Brown, New Zealand. Fig. 4. Plant from C. V. Piper, (state of) Washington.

CALVATIA CAELATA.



Explanation of Figure.

A small plant collected near Cincinnati, Ohio.

CALVATIA GIGANTEA.

PLATE 38.

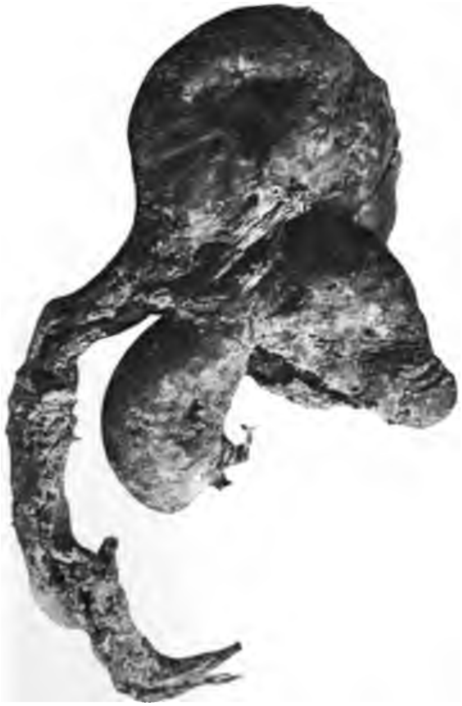


Fig. 1.

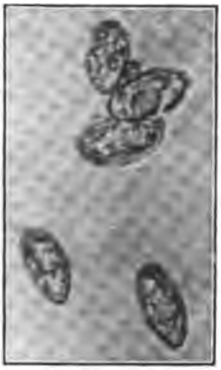


Fig. 2.

Explanation of Figures.

Fig. 1. Type specimen at Kew. Fig. 2. Spores (x 1000).

CASTOREUM RADICATU~~S~~m.

PLATE 39.

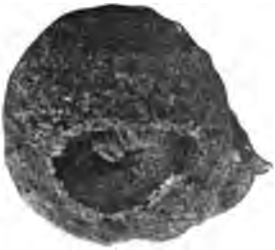


Fig. 1.

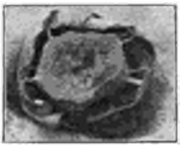


Fig. 2.

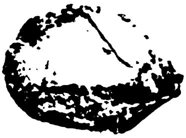


Fig. 3.

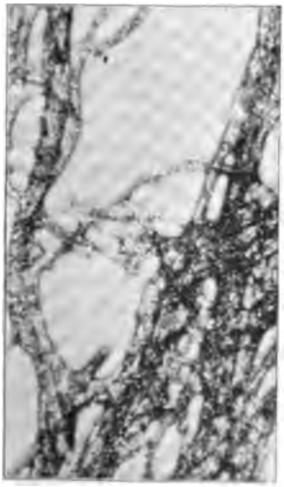


Fig. 4.

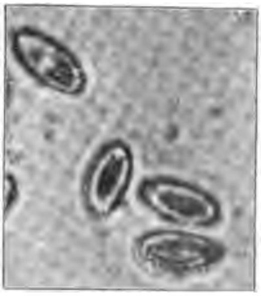


Fig. 5.

Explanation of Figures.

Fig. 1. Plant in exoperidium. Fig. 2 & 3. Section of endoperidium, showing core. Fig. 4. Capillitium (x 100). Fig. 5. Spores (x 1000). All from types at Kew.

MESOPHELLIA ARENARIA.

BOVISTELLA GUNNII—Plant subglobose (with little or no sterile base) Cortex furfuraceous. Gleba olive-umber. Capillitium long, branched, intertwined with pointed branches. Spores globose, smooth, 5 mic. with long pedicels.

This plant is based on one collection by Gunn, Tasmania, now at Kew. It differs from preceding species in its subglobose form and absence (entire?) of sterile base. The nature of the cortex is similar to that of Bovistella Ohiensis, the common species of the United States but the threads are quite different. It was described (Flo. Tasmania 2, 264), as Lycoperdon Gunnii.

THE GENUS LYCOPERDON.

Peridium flaccid, with or without a sterile base, opening by a small definite mouth. Cortex smooth, or usually covered with spines, either minute or large, which are generally arranged in fours. Capillitium of long, branched, intertwining threads. Spores usually globose, (sometimes oval) rough or smooth, often apiculate but not pedicellate.

This is the largest and most difficult genus of puff-balls. It is very abundant in the temperate regions and the numerous species form a large part of the "puff-ball flora" of these regions. In Australia it is not relatively so abundant and if we should judge by the specimens (26) that we have received from our Australian correspondents they mostly belong to two types, the "polymorphum" and the "pratense" type There are a few others at Kew, but very few.

THE "POLYMORPHUM" SECTION.

Cortex of very minute, furfuraceous spines. Spores olive, smooth, capillitium long branched, *deeply colored* threads. Sterile base compact, varying much in its development.

The sterile base and its relative development even in plants of the same collection is a very varying factor. The following "species", depending largely on size and absence of development of the sterile base, are really forms of one species.

LYCOPERDON POLYMORPHUM (Plate 34, fig. 1, 2, 3, 4, 5 and 6).—Cortex of minute furfuraceous spines, (rarely coalescing to form little warts). Gleba compact, olive. Sterile base peculiar, being formed of compact tissue of very small or no cells, very similar to the fertile portion.* Capillitium long, intertwined, deeply colored threads. Spores globose, olive, smooth, 4 mic.

This plant is quite common in Europe and Australia. In the United States, it usually takes a subglobose form, with a very little sterile base (called Lycoperdon cepaeforme). There is a tradition in Europe that it is the plant illustrated by Schaeffer (t. 294) under the name Lycoperdon furfuraceum and the plant is often still so called in European works. The cut of Schaeffer is very crude and doubtful. The first definite information we were able to obtain in tracing it back in European history is the work of Vittadini where the plant is well illustrated and described under the name Lycoperdon polymorphum and Vittadini's specimens are still in existence. We adopt it as it is a most suitable name and in addition Vittadini was the first to point out the peculiar sterile base character by which it differs from other species. The plant is quite common in Australia and is the same form that occurs in Europe excepting the cells of the sterile base which (while still very small) are slightly larger than in the European plant.

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*Usually the sterile base of Lycoperdon is composed of large cells very different from the fertile portion.

Specimens in our Collection.

New Zealand, Miss Jessie Dunn.

Australia, *Warracknabeal*, F. M. Reader. *Grantville*, J. T. Paul.

Melbourne, W. R. Guilfoyle, (Mr. Guilfoyle's specimens are very dark color and approximate the next.)

LYCOPERDON NIGRUM. —With all the internal characters of Lycoperdon polymorphum this plant differs only in its very dark color (almost black in fact). It is certainly only a dark form.

Specimens in our Collection.

Australia Warracknabeal, F. M. Reader.

LYCOPERDON CEPAEFORME (Fig. 31).—Plant subglobose, with very little sterile base. Other characters as the typical form of L. polymorphum.

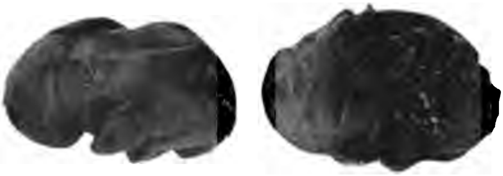

Fig. 31.

This form which is common and well marked in the United States is not so distinct in Australia where it shades into the typical form.

Specimens in our Collection.

New Zealand, *Wellington*, Miss Jessie Dunn. *Andover*, Robert Brown.

Australia, *Sydney*, R. T. Baker. *Adelaide*, Walter Gill.

LYCOPERDON PUSILLUM (fig. 32).—This is a little form devoid of sterile base and with a large thick tap root. The Australian plant is larger, has a more strongly developed root and the color of the gleba is not so dark, but I do not think it is practicable to keep the Australian plant distinct (under the name Lycoperdon australe) as has been proposed. I am unable to distinguish any marked difference in the spores as shown in a recent picture. Lycoperdon microspermum (Hook. Jour. 51-172) appears to me the same.

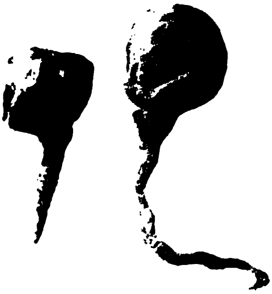

Fig. 32.

Specimens in our Collection.

New Zealand, Andover, Robert Brown.

Australia, Norwood, J. G. O. Tepper.

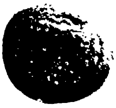

Fig. 33.

LYCOPERDON DERMOXANTHUM (fig. 33).—This is a little form devoid of sterile base and with the warts soldered together in nodules.

Specimens in our Collection.

Australia, Warracknabeal, F. M. Reader.

THE "PRATENSE" SECTION.

Sterile portion separated from the fertile portion by a distinct diaphragm. Capillitium hyaline, septate.

LYCOPERDON PRATENSE (plate 34, fig. 7, 8, 9, 10, 11 and 12).—Peridium depressed. Cortex short spines (about 2 mm. long), falling away from the old specimens and leaving the peridium smooth. Peridium opening by a large irregular mouth.* Sterile portion of large cells separated from the fertile portion by a distinct diaphragm. Gleba olive. capillitium hyaline, (or faintly colored) septate, branched threads. Spores globose, smooth, light colored 4 mic †

We adopt the name Lycoperdon pratense. there being a tradition in Europe that it is Persoon's species and the plant being generally so known now. Still there is no direct evidence on the point; Persoon left no specimens and his figure which is quite characteristic as to shape has the surface broken into areas by cracks, never a feature of any specimen I have ever seen. The first definite evidence is that it is Lycoperdon hyemale of Vittadini. Not only his specimens exist, but he clearly characterizes it, pointing out the peculiar diaphragm so marked in this species. Unfortunately he referred it to Bulliard's figure of Lycoperdon hyemale, and the figure is probably not this plant and would always be a bone of contention if the name were adopted The plant is very common in Europe and Australia and has the same characters in both countries. It does not occur in the United States to my knowledge.

A good notice and figure of the Australian plant was published in Proc. Linn. Soc. New South Wales (Nov. 1900) by D. McAlpine under the title "On the Australian Fairy-ring Puff-ball". Unfortunately he misdetermined the plant, referring it to Lycoperdon furfuraceum.

Synomyn, Lycoperdon natalense (Cooke's Handb).

Specimens in our Collection.

New Zealand, Andover, Robert Brown. *Wellington*, Miss Jessie Dunn.

Christ Church, Robert M. Laing and Robert Brown. *North Island*. J.S.Tennant.

Victoria, Grantville, J. T. Paul.

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*In its dehiscence this species is intermediate between Lycoperdon and Calvatia.

†The spores of this species are remarkably uniform in size.

THE "CRUCIATUM" SECTION.

Spores olive, smooth. Cortex of short cruciate spines, peeling off in patches.

Lycoperdon cruciatum the typical species, is very common in the United States, very rare in Europe and does not occur in Australia to my knowledge.

LYCOPERDON STELLATUM.—Cortex of strong, thick, rugulose, connivent spines, peeling off in patches and leaving the peridium smooth. Gleba olive. Spores smooth, globose, 5 mic. Capillitium colored.

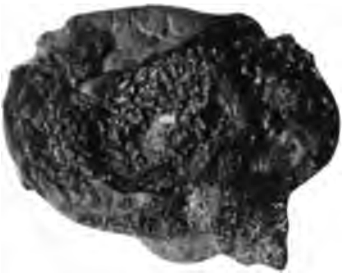

Fig. 34.

This is a strongly marked species known from a single specimen at Kew (fig. 34) from Miss Brooks, Israelite Bay, Australia. The specimen is not cut open and we cannot say as to the sterile base but it seems to be scanty. The plant is evidently closely related to cruciatum but differs in the larger, rough cortex spines.

THE "GEMMATUM" SECTION.

Gleba olive. Spores small, globose, smooth or minutely rough. Columella prominent.

Lycoperdon gemmatum and Lycoperdon pyriforme are the most common species that occur in the temperate regions of the world, and form a large part of all museum collections of puff-balls So numerous are they in the museums of Europe that we did not keep an itemized account of the specimens and cannot remember whether or not we have noted typical specimens from Australia. Both are recorded from Australia, but neither has reached me direct from my Australian correspondents.

LYCOPERDON GEMMATUM.—Cortex of *soldered* warts, like little "gems", which fall away and leave scars on the peridium. Gleba olive. Columella prominent. Spores small (4-5 mic,) globose, minutely rough, (almost smooth).

This species takes an infinite number of shapes in the temperate regions of the earth and varies much as to appearance but can always be recognized by the peculiar warts or the scars where the warts have fallen. We present photographs, (fig. 35) of a specimen (from America) covered with these peculiar warts and also one after the warts have fallen.

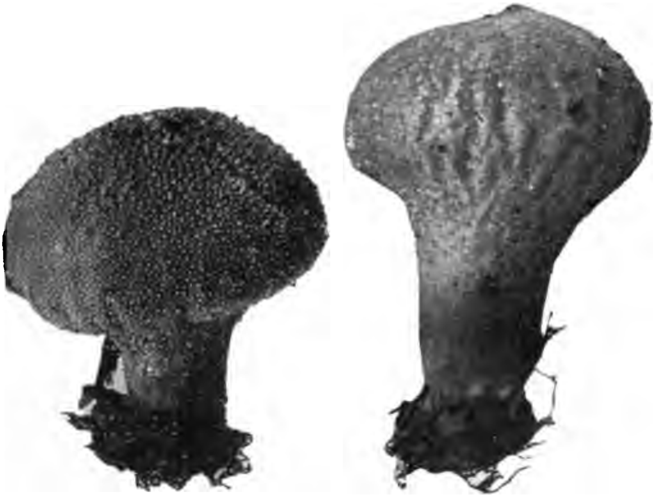

Fig. 35.

SYNONYMS.—The peculiar warts of this species were first and best described by Persoon under the name Lycoperdon perlatum. The name gemmatum however, is a much better name and has come into general use.

LYCOPERDON TASMANICUM.—This has the gemmate cortex but the spores are a little larger and more rough. I found it at Kew collected in Tasmania by Rodway. I doubt if the spore difference is enough to characterize a species.

LYCOPERDON COLENSOI.—This plant collected in New Zealand by Colenso was referred by Berkeley to Lycoperdon elongatum quite a different species of India. It was separated by Massee when he noted how different are its spores. It has soldered warts intermediate between gemmatum and pyriforme. I should have referred it to the former species.

LYCOPERDON PYRIFORME (fig. 36).—Cortex of small spines, sometimes somewhat nodular. Gleba olive. Columella prominent. Spores small (4-5 mic.) globose smooth.

This is a most common species in Europe and America and usually grows on rotten logs or stumps It takes a number of forms but is readily recognized by the characters above and the habitat. It always has long, white, cord-like mycelium roots.

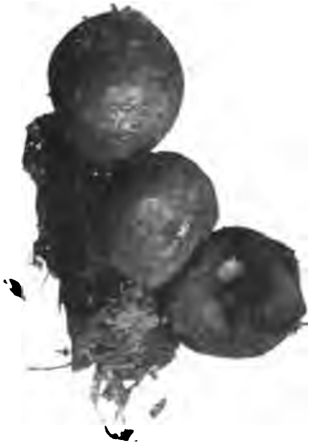

Fig. 36.

THE "ATROPURPUREUM" SECTION.

Gleba purplish, spores large, rough, mixed with separated pedicels. This is a strongly marked section in Europe and America embracing such species as echinatum, atropurpureum, velatum and others all of which have nearly the same gleba and spores but differ in cortex characters. The only specimens we have seen of this section from Australia were called Lycoperdon violascens(Trans R Mic Soc.87-706). The specimens are old with smooth, very thin peridia but the cortex characters by which the species of this section are distinguished, having disappeared, we feel the specimens cannot be satisfactorily referred.

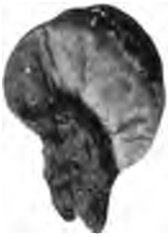

Fig. 37.

LYCOPERDON COPROPHILUM. — Plant subglobose, with white mycelium roots, cortex of short stiff, scabrous spines. Sterile base none. Gleba dark with faint tinge of purple. Spores small, (4 mic.) apiculate, slightly rough. Grew on dry cakes of cow manure.

This is a most peculiar species known only from Australia, and the only puff-ball to our knowledge growing on cakes of manure. It does not belong to the atropurpureum section of the genus having spores much too small, but we place it here for the present to avoid multiplying the sections. The type specimens at Kew (fig. 37) are from F. M. Bailey, Brisbane.

AN "ANOMALOUS" SECTION.

There is an anomalous section in the genus Lycoperdon which I doubt will be retained in the genus when its life history becomes known. The gleba is characterized by the scantiness of the capillitium and its nature is usually that of shreds rather than threads. The gleba has a resemblance to that of Lycogala though the plants are not Myxomycetes. Most of the species have very small, rough spores, the following being the only species we know with smooth spores.

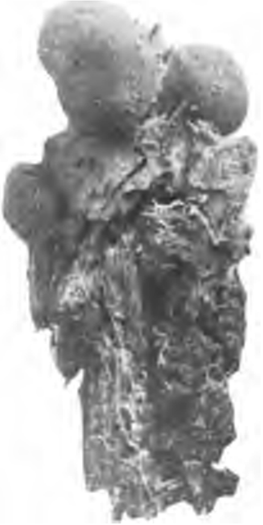

Fig. 38.

LYCOPERDON TEPHRUM. — Peridium thick, and rigid. Cortex minute nodules. Sterile base none. Gleba olive. Capillitium scanty. Spores smooth globose 4 mic.

Grows on rotten wood. The plant (fig. 38) externally has a different appearance from Lycoperdons, but it is easier to note the difference than to describe it.

Specimens in our Collection.

Sydney Australia, R. T. Baker.

NOTE —I did not find type specimens of the following species or they were so scanty that I could gain no definite idea of them. Lycoperdon substellatum,(Trans. R. Mic. Soc. 87-720), Lycoperdon reticulatum (Flora N. Zea. 2-190) Lycoperdon mundulum (Grev. 9-3). The specimen from Australia referred to Lycoperdon Cookei I should call a Bovistella.

THE GENUS CALVATIA.

Sterile base none, or usually well developed. Peridium flaccid and brittle, dehiscing by the breaking up of the upper portion. Capillitium long. intertwined. The genus, although it is usually advertised as "Fries," was made known to science by Morgan, an American author. It is just beginning to be recognized in Europe. Formerly it was included in Lycoperdon but differs in the dehiscence of the peridium. In Lycoperdon the peridium opens by a small definite mouth. In Calvatia it breaks up in pieces and falls away exposing the gleba Lycoperdons are usually small plants. Calvatia embraces all of the large species formerly called Lycoperdons.

CALVATIA LILACINA (Plate 35, fig. 1).—Sterile base usually strongly developed, sometimes almost none. Cortex smooth. Gleba always purplish, sometimes bright lilac color, sometimes more grayish but always with a purplish tinge. Capillitium long, branched, intertwined, uniform threads, very light colored under the microscope. Spores globose, rough, 5-7 mic.

This is a plant of world wide distribution and very variable as to the development of the sterile base. It can always be known by the purplish color of the gleba. In Europe it is of a southern range and has been usually called Lycoperdon fragile. In the United States it is very abundant extending north into Canada. Since the publication of Morgan's work it is generally known as Calvatia cyathiformis.* In Australia it is equally common and numerous specimens have reached Europe. The plant being quite variable has a number of synonyms of which Bovista lilacina (Hook. Jour. 45-62), Lycoperdon Novae-Zealandiae (Ann. Nat. Sci. 3-5-162), and Lycoperdon lilacinum (Handb. Aust. Fung). have been applied to, the Australian plant.

Specimens in our Collection.

Australia, Adelaide, Walter Gill. *Sydney,* R. T. Baker. *Grantville,* J. T. Paul.
New Zealand, Wellington, Miss Jessie Dunn.
New Caledonia, donated by P. Hariot, Museum, Paris.

CALVATIA CAELATA (Plate 36, fig. 1,2,3 and 4).—Plant obovoid or turbinate, rarely subglobose. Cortex a thick, floccose layer composed of dense warts split, forming coalescent spines, much split at the base† This cortex breaks up in an areolate manner, and finally disappears from old specimens of the sterile bases. Peridium breaking away irregularly forming a large lacerate opening. Gleba olive Capillitium of deeply colored threads two

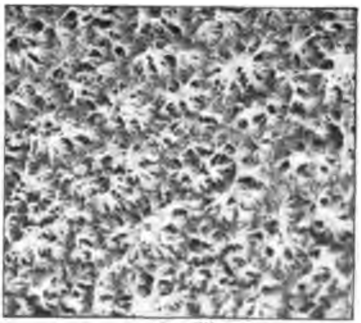

Fig. 39.

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*While we employed this name at first, we have discarded it. It was founded on a blunder, and has no application whatever to the plant except a false one. On the other hand the name lilacina which Berkeley proposed is as suitable a name as could be applied to it

†A better idea of this cortex than we can express in words is given by our figure (39), *enlarged.*

or three times as thick as the spores. When ripe they break into short pieces.* Spores small, globose, 4-5 mic., smooth.

Calvatia caelata is not so widely distributed as the previous species. It grows quite commonly in Europe and the western portion of the United States. Two forms occur which at first view seem quite different. The usual plant has an even surface, and this form we would call Calvatia caelata because it is the common plant and the one usually so known. As a matter of history however, Bulliard's figure on which the name is based is the next form.

CALVATIA FONTANESII (Plate 36, figs. 2 and 4.)—Certainly only a form of the previous plant. The warts are thick and the surface broken into large areoles. This form is more rare in Europe and more common in our western United States. There is a New Zealand specimen at Kew from Colenso.

Calvatia farosa is a form with peridium becoming lacunose as shown on plate 36, fig. 3. It was figured by Rostkovius, and lacunosa would have been a better name for it. We have specimens of this form from Robert Brown, Andover, New Zealand.

Specimens in our Collection.

New Zealand, Christ Church, Robert M. Laing. *Andover*, Robert Brown.

CALVATIA GIGANTEA (Plate 37).—Plant globose, reaching often a *very large size*.† Peridium with a smooth cortex, when ripe breaking into fragments and falling away. Sterile portion none. or sometimes slightly developed, but compact, of the same texture as the fertile portion‡ Gleba bright yellow, then brownish olivaceous. Capillitium long, intertwined, branching, deeply colored threads about as thick as the spores. Spores globose, smooth, 4-5 mic.

This large plant which is popularly called the "giant puff-ball" is of wide distribution. It is of rather rare occurrence in the United States§ but one of my correspondents writes me it grows in great abundance in New Zealand. The thickness of the peridium varies. In New Zealand specimens from Robert Brown it is little over one mm. thick; in an American specimen fully 2 mm. No one can mistake the plant for it is the only *large globose* species known in Europe, Australia or the United States. Notwithstanding, it has a wealth of synonyms, viz: Calvatia maxima. Bovista maxima, Lycoperdon maximum, Lycoperdon Bovista, Globaria Bovista, Lycoperdon giganteum, Bovista gigantea, Globaria gigantea, Langermannia gigantea.

Specimens in our Collection.

New Zealand, Andover, Robert Brown, a liberal lot.

Oval spored form from J. G. O. Tepper, Norwood, Australia. We have some specimens with spores not truly globose but slightly oval. It has been suggested that this may be the original form of Calvatia gigantea and the name Calvatia primitiva proposed, and that the spores have become round through evolution, but of course that is merest supposition.

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*Hence the gleba of this species has very little cohesiveness and falls out from the specimen so readily that they are usually the "dirtiest" puff balls we receive.

†It has been stated that specimens have been collected three feet in diameter. I have several times seen them a foot and a half through.

‡When present it is of a different nature from the sterile base of most puff-balls. It is never formed of large cellular tissue as erroneously shown in Bulliard's figure.

§I have seen it growing but once.

CALVATIA CANDIDA (Plate 35, fig. 2, 3, and 4).—A very small plant, rarely over an inch in diameter, with a tap root. Peridium very smooth and shiny, thin and brittle, breaking away in pieces. Sterile base small, compact. Gleba olive. Capillitium of uniform, intertwined, branched threads, often septate and very light colored under the microscope. Spores globose, smooth,* 4-5 mic. slightly thicker than the threads.

This is a very rare plant in Europe, only a few collections being known. It was fairly well figured by Rostkovius but was really made known very recently by Dr. Hollós to whom all the credit should be given. It seems to be more abundant in Australia and three collections from that country have reached us. It is unknown from the American continent.

SYNONYMS.—Langermania candida (Sturm Flo 3-257) Lycoperdon candidum (Sacc. 7-483.)

Specimens in our Collection.

Australia, *Norwood*, J. G. O. Tepper. *Warracknabeal*, F. M. Reader.

Adelaide, Walter Gill.

CALVATIA OLIVACEA (Plate 35, fig. 5).—Peridium globose, 5 cm. in diameter. Peridium "thick, at first soft and pliant like leather", smooth. Gleba olive. Sterile base none. Capillitium long, colored. slightly thicker than the spores. Spores globose, smooth, 5 mic.

The only specimen known is the type (Bovista olivacea Grev. 16-77) at Kew from Reader, Australia. It is similar to the preceding species but is larger, peridium is thicker, and capillitium more deeply colored. It is well shown in Handbook fig. 118 excepting I find no pedicellate spores.

CALVATIA SINCLAIRII—Lycoperdon Sinclairii (Jour. R. Soc. 87-716), is founded on a sterile base of Calvatia collected in New Zealand by Sinclair. It has a thick reddish, smooth (now) peridium, pyriform, apiculate, smooth spores, and thick, deeply colored capillitium threads. Its affinities are close to Calvatia caelata.

THE GENUS GALLACEA.

Peridium single. Gleba of permanent cells forming a thin layer adhering to the peridium, the plant being hollow at the center. Capillitium none. Spores fusiform.

This genus is based on "Mesophellia Scleroderma" (Grev. 14-11). The plant cannot be classed in the genus Mesophellia as its nature and the nature of the gleba is entirely different.

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*The spores are smooth under ordinary magnification. Under a very high power they are said to be minutely warty.

GALLACEA SCLERODERMA. — Peridium simple, globose, thin, ochraceous, externally broken into scale-like areas. Gleba olivaceous in color consisting of a layer of small irregular cells. which adhere to the peridium, the center of the specimen being hollow. Capillitium none. Spores (fig. 40) elliptical, hyaline, smooth, 4x10 mic.

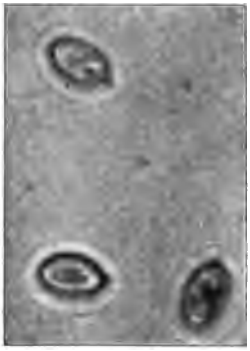

Fig. 40

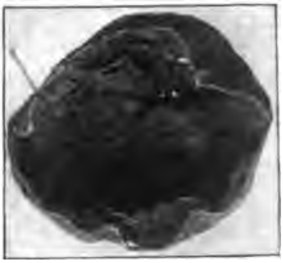

Fig. 41.

This plant externally somewhat resembles Scleroderma aurantiacum in color and scales but the plant is so light and fragile that the resemblance stops with the exterior. It reminds me of an "oak-ball".* Only one specimen is known (fig. 41), now at Kew, which was collected by Reader, New Zealand.

THE GENUS CASTOREUM.

Plants with a strong rooting stem. Peridium double, cartilaginous† opening (apparently) by an irregular fracture. Gleba homogeneous. Capillitium hyaline. Spores fusiform.

This is a most distinct genus known only from Australia. The spore relations are to Mesophellia but there is no genus that is very close to it.

CASTOREUM RADICATUM (Plate 38, fig. 1 and 2). – Peridia double, about of equal thickness, smooth, fibrous, tough, dehiscing? by an irregular opening. Gleba filling the cavity. Capillitium of flaccid, crumpled, white threads mixed with brownish spores. Spores fusiform, verrucose, about 10 x 5 mic.

This is a most curious plant, known from a couple of specimens at Kew, collected St. George's Bay, Tasmania by G. Wintle. One of the specimens (as shown on our plate) is double, but that double plants are usually borne on the same rooting stem is not probable. The collector states that the plant is "eaten by the kangaroos and bandicoots." The plant is well shown in Handbook fig 122, though the gleba is too yellow and threads are not tense and straight as shown.

THE GENUS ARACHNION

The genus Arachnion can be briefly described as being puff-balls within puff-balls. The entire interior (fig. 42, enlarged 3 times) of a ripe specimen is filled, not with dust (spores and capillitium) as most puff-balls, but with a granular substance that feels “gritty” when rubbed between the fingers. These granules are peridioles; they are little sacs containing spores. They are small but can be seen under a hand glass.

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*I do not know that Australian readers are familiar with "oak-balls." They are excrescences, a kind of gall, caused by an insect and very common on the oak (Quercus) in the United States.

†I know not why the inner peridium is described as "subgelatinous."

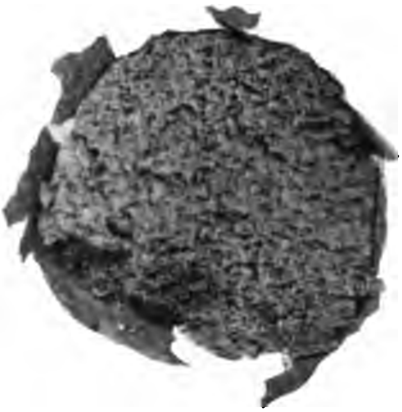
Fig. 42.

The genus is well known in the United States by one species, Arachnion album which is fairly common. Similar (or perhaps the same) species occur in South America, West Indies, South Africa and Australia. In the latter country its occurrence is based on a single known specimen collected more than sixty years ago.

ARACHNION DRUMMONDII.—Plant globose, without sterile base, about 1 cm. in diameter. Peridium smooth, thin, fragile, rupturing irregularly. Peridioles irregular in size. Spores globose, smooth, 5-6 mic. apiculate, or short pedicellate.

Arachnion Drummondii is very doubtfully distinct from Arachnion album of the United States. The spores are slightly larger, more strongly apiculate and the habits of the plant according to the collector's notes are different.* The plant was named (Jour. Linn. 18-389) incidentally with Agaricus cycnopotamia (but can hardly be called described) as follows—“attached to the specimen is a species of Arachnion (the spores are globose and .0002-.0003 inch in diameter) which may be called A. Drummondii, Berk.” This led to a funny error. Saccardo compiles it ‘ad Locellinam cycnopotamiam Berk,” and in Cooke's Handbook we find the statement “Attached to Agaricus (Acetabularia) cycnopotamia.” The plant has nothing whatever to do with the agaric excepting that Drummond sent it to Berkeley glued on the same sheet of paper.

THE GENUS MESOPHELLIA.

This is one of the most curious genera I have ever seen. It has little relationship to any other described genus. The plants are subterranean, growing in the sand. In the center is a hard core, white and of the texture of the finest grained hard wood. No other fungi to my knowledge produces a tissue as hard as this. Surrounding this core is the inner peridium, at a distance of 3 to 5 mm. from it, and joined to the core by ligaments of the same hard tissue that proceed from the core Between the core and the inner peridium is the gleba of a light greenish color. This consists of coarse, shreddy capillitium arranged in a parallel manner* proceeding from the core to the inner peridium. The spores abundant in the gleba are elliptical-fusiform, light greenish color, almost hyaline under the microscope. Only to phalloid spores can they be compared in shape and color. The outer peridium is thick, rough, with adhering sand, and formed of coarse fibrous tissue.

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*“Enclosed you will find also some portion of a curious fungus with the habit of a small Lycoperdon. It is almost subterranean, just reaching the surface with its upper part. It differs from polysaccum in having the sacs uniformly not larger than a poppy seed, and in not having them inbedded in a matrix. Each sac small as it is contains numerous sporules. The whole is pure snow white turning yellow.”—Drummond's note to Berkeley. It is a good account of the plant and shows Drummond was an observing man.

MESOPHELLIA ARENARIA (Plate 39, fig. 1, 2, 3, 4 and 5).—The description of which is covered in the above generic notes was first collected in Tasmania by Archer and well described and figured by Berkeley (Trans. Linn. 22-131). It was afterwards more abundantly collected by T. Muir "Near the entrance of the garden river West Australia" and sent to Berkeley by Mueller† in 1885. The spores are elliptical fusiform, smooth, 4 x 12 mic.

"Diploderma glaucum" collected Scamander River by Wintle, I think is Mesophellia arenaria.

MESOPHELLIA INGRATISSIMA—This plant is described as "strong-scented" and as having spores 10-12 mic. in diameter. I did not find the type specimen at Kew.

MESOPHELLIA SABULOSA.‡—Appears to me very close to M. arenaria but differs in the nature of the exoperidium which instead of being formed of coarse fibrous tissue takes more the nature of an agglutinate sand case. The spores are also described as larger (7 x 14 mic.)

MESOPHELLIA PACHYTHRIX.§—Differs from M. arenaria in several respects. The capillitium is of a different color and much coarser, being compared in color and texture to the fibers of outer shell of a cocoanut. The spores are thicker being 5 x 11 mic. and are minutely warted.

THE GENUS MITREMYCES.

Exoperidium subgelatinous,‖ in the Australian species falling off like a cap. Endoperidium opening by longitudinal slits along the edges of raised, rayed teeth. Spores ochraceous, oblong-elliptical in the only known Australian species. Capillitium none. The spores are contained in a special sac lining the endoperidium. As the plant matures the sac contracts forcing the spores through the slits of the rayed mouth.

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*In the little fragment of gleba that I brought home with me and from which our microphotograph (Plate 39, fig. 4) was made, it was impossible to preserve the parallel arrangement of the capillitium. However, in the specimen it is quite evident to the naked eye.

†Mueller was impressed with the novelty of this plant and wrote Berkeley a long letter requesting that it be called "Potoromyces loculatus Mueller." As Berkeley had already described it as Mesophellia arenaria he probably so informed Mueller. Twenty years latter Dr. Hollos, a Hungarian botanist found in the museum at Wien a specimen that Mueller had sent under his name. Dr. Hollos, innocent of any knowledge of Berkeley's work with the plant, at once published a description of the wonderful "new genus" Potoromyces (Nœv Kœz, 1902-155).

‡Diploderma sabulosum (Grev. 21-38),

§Diploderma pachythrix (Grev. 18-50).

NOTE—There is a specimen from Melbourne in Broome's herbarium, British Museum, labeled "Mesophellia arenaria" which is not this species and is probably not the genus. The gleba and spores are similar (the spores much shorter and smaller) but there is with the fragmentary specimen no "core" nor exoperidium. It is elongated in shape and I think was probably not subterranean.

‖An American species (M. cinnabarinus) is noted for the thick gelatinous exoperidium, resembling to some extent the volva of the phalloids. It breaks up in pieces and falls away. The Australian species differs from all other known species in having the exoperidium fall away *in a single piece* like a cap. From the dried specimen I judge it is not so gelatinous as other species.

The genus Mitremyces[*] is one of the strangest in the known puff-ball world. It occurs in the United States, Japan, Australia, Java, Ceylon, India and the Malay Peninsula. Eight species (with numerous synonyms) are known. But one from Australia.[†]

MITREMYCES FUSCUS.—Plant very dark color, almost black when dry.[‡] Exoperidium (fig 43) falling off in one piece as a cap.[§] Spores (fig. 44) elliptical, oblong, minutely rough, varying in size 7 to 10 mic.

This plant judging from the collections that have reached England is not rare in Australia. There are collections at Kew (fig. 45) from "Melbourne, Miss Campbell," "Tasmania, Milligan," "Melbourne, Berggren" "Epping Forest Van Dieman's Land, Lawrence," "Lake Muir, Th. Muir" and at the British Museum "Beenah Victoria, Miss Flora Campbell."

Fig. 43.

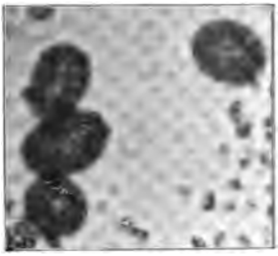
Fig. 44

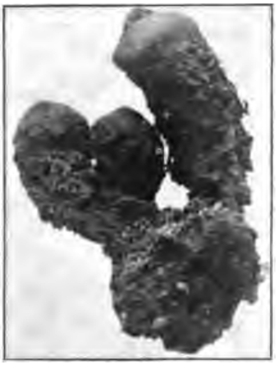
Fig. 45

MITREMYCES LURIDUS (Fig. 46.)—With every character of the previous species excepting size, I can consider it only a small form of Mitremyces fuscus.[‖] There is but one collection known viz. by Drummond, Swan River, many years ago.

Fig. 46.

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[*] We use the generic name that was employed by Berkeley and by botanists generally for more than seventy years. Recently much confusion has been introduced by digging up an old name "Calostoma" for the purpose of making "new combinations." We strongly disapprove of this method of confusing names.

[†] If we consider, as I do, Mitremyces luridus as a small form of Mitremyces fuscus Mitremyces viridis in Cooke's Handbook is based on specimens so determined at the British Museum, collected by Miss Campbell at Beenah Victoria. It was afterwards described as Calostoma aeruginosa. It is Mitremyces fuscus *tout a fait*.

Mitremyces australis under which name Berkeley labeled several specimens at Kew is purely an error, I think due to misreading the specific name of Mylitta australis on the page following the description of Mitremyces fuscus.

Mitremyces coccineus (Sac. 7, 70), is also purely an error of compilation, no such species being described

[‡] In this respect the Australian species differs from all others known. Several are noted for their bright color, one, Mitremyces cinnabarinus of the United States being bright red.

[§] Another character in which the Australian species differs from all other known species.

[‖] When described it was said to differ from all species in not having a red lining to the endoperidium teeth. I think this is an error as I notice an indication of the red lining on the specimens but it has mostly faded out. I think there is no known exception to the rule that all species of Mitremyces have the lining mouth red when fresh.

EXCLUDED GENERA AND SPECIES.

PAUROCOTYLIS PILA.—This plant which was included by Berkeley in the Gastromycetes has been shown by Patouillard (Bull. Myc. 03-339) to belong to the Tuberaceae, having its spores in asci. We have received from Robert Brown, New Zealand some fine specimens of which we are enabled to present an enlarged photograph (fig. 47) that will give a correct view of the internal structure. The cuts heretofore issued have been very inaccurate. (Fig. 48) plant natural size, fig. 49 section.

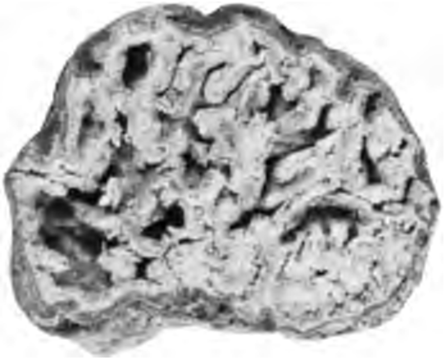

Fig. 47.

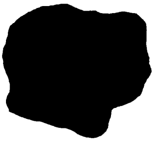

Fig. 48.

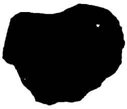

Fig. 49.

PROTOGLOSSUM LUTEUM.—We would class this plant as a Hymenogaster. We have never made a close study of this order, but the genus appears to us to be strongly distinct. The figure in Cooke's Handbook does not belong to the species, having been made from a misdetermined plant of quite a different nature and spores.

Cycloderma platysporum, Diploderma suberosum. Diploderma album, Diploderma fumosum and Diploderma melaspermum are all erroneous (cfr. Myc. Notes p. 181).

THE LLOYD LIBRARY AND MUSEUM.

This institution, while nominally an incorporated organization, is in reality dependent upon the support of two brothers, C. G. and J. U. Lloyd, who provide the funds for its maintenance, each for his own department; the former Botany and especially Mycology, the latter Materia Medica and Pharmacy. The institution is located at No. 224 West Court St., Cincinnati, Ohio, and is a four story building erected by Mr. C. G. Lloyd for this purpose in 1902.

THE LIBRARY.

This is in charge of Captain William Holden, Librarian. It is devoted exclusively to the aforementioned subjects, and although of comparatively recent growth, it compares favorably, in number of volumes at least, with such old established libraries as are to be found at Kew. In monetary value, or in practical working value to the systematic botanist, the Lloyd Library does not compare with Kew, for the latter is a selected library of years of growth, devoted specially to the wants of the systematic botanist. The Lloyd Library aims eventually to embrace all books relating to botany, pharmacy, materia medica and allied sciences. With this object such subjects as physiological botany, elementary text books, technical botany, pharmacopoeis, etc., which would not be considered as in the scope of Kew are systematically collected in the Lloyd Library.

THE HERBARIUM.

This consists of about thirty thousand specimens (estimated) which were mostly obtained through exchange by C. G. Lloyd during the earlier years of his life. When Mr. Lloyd became interested in Mycology, some ten years ago, this feature was practically abandoned. Prof. W. H. Aiken has recently taken charge of this department and it is expected that from this time on the herbarium will have renewed life and activity.

Lloyd Library and Museum.

THE MUSEUM.

One floor of the building is devoted to a museum of fungi and there have accumulated many thousand specimens. During recent years Mr. C. G. Lloyd has devoted himself exclusively to the study of Gastromycetes, popularly known as the puff ball family. With the cooperation of a large number of correspondents from every country in the world, more specimens of these plants have found their way to this museum than can be found in all other museums in the world combined. Each specimen is named, and labeled with the name of the collector and locality, and is preserved in the museum, no matter how well the same species may be represented. Some common species, such as Lycoperdon gemmatum, are represented by over three hundred different collections.

ITS DESTINY.

This institution will never be sold or broken up. When the life works of its builders are finished, funds will be provided for its continuance under the care of some institution or university, best calculated to serve science. The entire collection of books and specimens is pledged by its founders to be donated intact to Science.

INDEX TO SPECIES.

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BULLETIN NO. 13. SEPT., 1909. MYCOLOGICAL SERIES, NO 4

BULLETIN
of the
LLOYD LIBRARY
of
BOTANY, PHARMACY AND MATERIA MEDICA

J. U. & C. G. LLOYD
CINCINNATI, OHIO

MYCOLOGICAL SERIES, No. 4

Synopsis
of the
Known Phalloids
With an Illustration of Each Species

By C. G. LLOYD

Ed. Fischer.

In this pamphlet devoted to phalloids I am pleased to present a photograph of Professor Ed. Fischer, Bern, Switzerland, who is the best authority in the world on the phalloid subject.—C. G. L.

INTRODUCTION.

Phalloids are in many respects the most remarkable fungi that grow. Usually they are excessively fetid, and persons who would pass by an ordinary fungus without noticing it have their attention strongly fixed when they chance upon one of these "ill-smelling things." In addition they assume most bizarre shapes and often bright colors. I hope these features, probably intended by nature to attract flies, will attract the attention of those to whom this pamphlet is sent.

From the very nature of phalloids, they should be studied in the countries where they grow. Accurate work can not be done in Europe with such fugitive plants, and a large part of what has been written on the subject is not reliable. More has been added to our knowledge by the observations of Penzig, Moeller, Petch, Long, and Cobb, in very recent years, than from all other sources, and these men observed and studied the phalloids in the countries where they grow.

It was with the view of summarizing what is known of the phalloid subject and making it available to students in all parts of the world that this pamphlet has been written. We hope to interest observers in such unworked fields as India, Japan, Australia, West Indies, and South America (except portions of Brazil). We should be glad if any observer in any country where the phalloids are not well known (cfr. page 6) would publish with good photographs an account of such species as he observes. We believe that all the well-known species can be readily determined from this pamphlet.

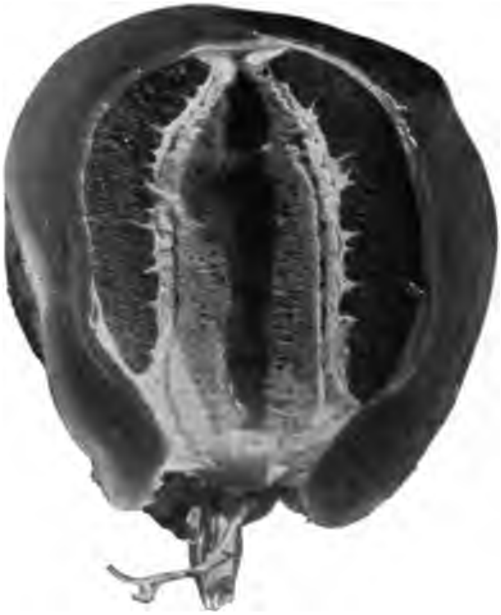
We trust, however, that this will not lead to a flood of "new species" by inexperienced observers. The species of phalloids, like all fungi, are widely distributed, and wherever you may be located most of the phalloids you will find are recorded in this work. They may differ in unimportant details and seem new to you, but we strongly advise you before publishing to first submit a good photograph, color notes, and a dried specimen to Professor Ed. Fischer or to myself for an opinion.

C. G. LLOYD,
63 rue Buffon, Paris, France.

WHAT IS A PHALLOID?

It would be out of place in a work of this kind, intended for general distribution, to enter upon any technical, botanical discussion of what constitutes a phalloid. Most persons know them by reputation, and with certainty if they have met them. If not, they will know them as soon as they look through our pictures.

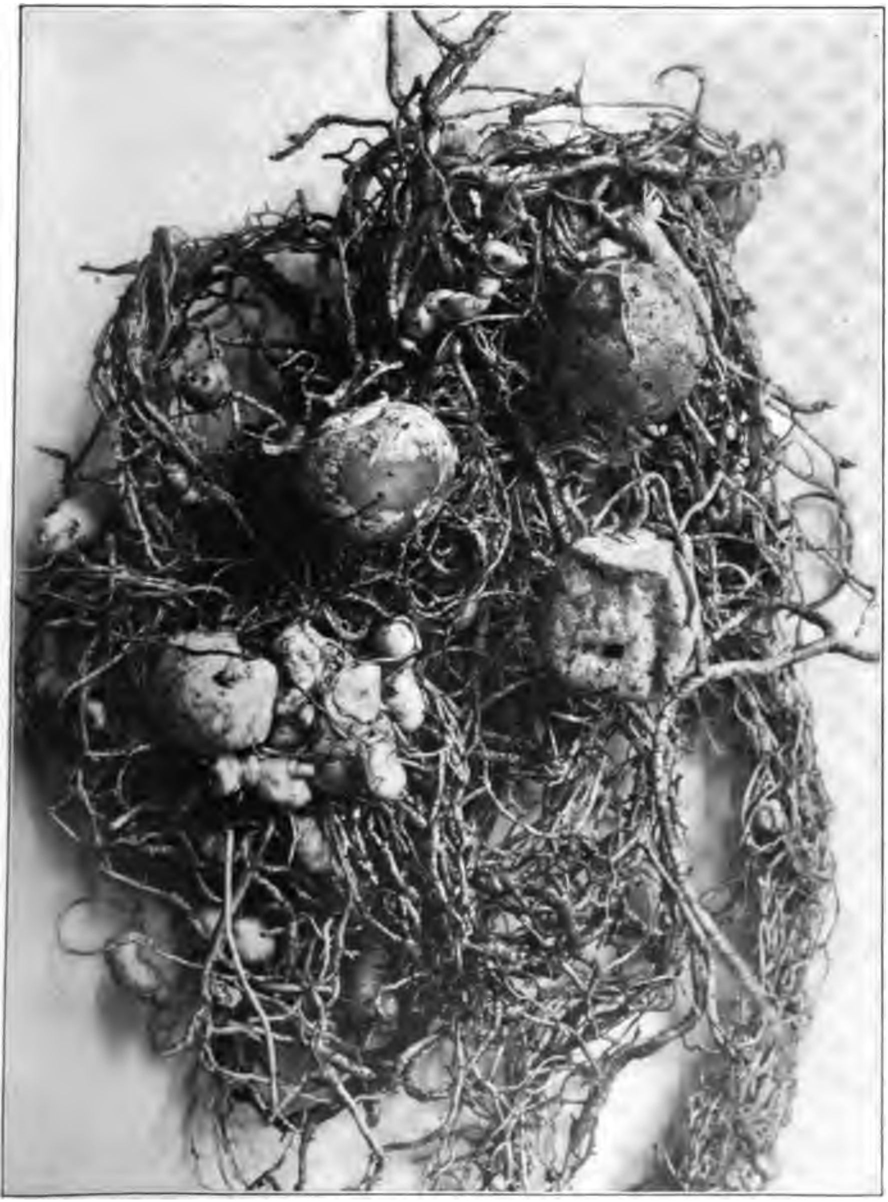
Phalloids are always fleshy fungi, always fetid, and appear as if by magic in our woods and fields. When young, they are enclosed in a gelatinous membrane called a volva, which breaks, and the plant develops so rapidly that I will not go into details for fear that some of my readers will think I am not telling the truth. I have often carried home the eggs, but have never seen them develop, as my specimens have always developed during the night. In a single night the species observed have reached a height of eight inches. One author has a picture showing a plant to have grown 4 cm., or an inch and a half, in one minute of time. Of course this is not true growth by the accretion of cells, but rather a mechanical process by the expansion of cells.



The "roots," or mycelium, as it is correctly called, of phalloids grow in the earth, or rotten wood, and take the form of long, white cords. The illustration on the opposite page is a cluster of this mycelium, which has developed several "eggs," or young phalloids. If we cut open one of these eggs we will find it to contain an undeveloped plant, as shown in the figures herewith. But it is best not to cut them open, but to take them home and place them on a dish, and in a few days you will have some perfect plants.

THE COLOR OF PHALLOIDS.

There are only three colors known in the phalloids: red, yellow, and white. Most species are red, or some shade of red, pink, flesh, or orange. A few are yellow, and many are white. The yellow and red phalloids seem quite distinct, and do not run into each other, but the red species are apt to have white forms.



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DEFINITION OF TERMS.

In the description of phalloids it is necessary to use a few botanical terms, but they are simple and will be readily understood from the following explanation.

VOLVA.—All phalloids (excepting one genus, Phallogaster) when young are enclosed in a subglobose membrane called the volva. In this state a phalloid can well be compared to an egg; in fact, it is customary to speak of young phalloids as "eggs." The volva or shell, however, is a soft, thick, gelatinous membrane. When the plant develops the volva bursts at the top and remains as a cup at the base of the mature phalloid. All our pictures of phalloids show the volva at the base of the plant, at least all pictures that were made from perfect plants. If there is no volva at the base it is because the illustration was drawn from an imperfect specimen.

RECEPTACLE.—This is a term that is applied to the portion of the plant that bears the greenish, mucilaginous mass (called the gleba). In some phalloids (such as Clathrus) the entire plant, exclusive of the volva, forms the receptacle. In others, such as Simblum, the receptacle is borne on a stem. Some phalloids are a simple, stem-like structure and bear the gleba directly on the upper portion, then of course the upper portion of the stem is the receptacle.

GLEBA.—This is a greenish, viscid, fetid substance with which all phalloids are supplied. It is in fact the fruiting portion of a phalloid, for it contains innumerable, microscopic spores which are analogous to the seed of flowering plants. It is the gleba of a phalloid that is usually so excessively fetid. This bad odor, as offensive as it may be to us, serves a useful purpose to the plants, as it attracts flies and other insects that are the means of the dispersion of the spores.

STEM.—The stem (or stipe) of a phalloid needs no special explanation. It is used in the ordinary sense of the word. Some phalloids have no stems.

PILEUS.—There are some phalloids (the genus Phallus) that have the gleba borne on a special membrane on the top of the stem. This is usually conical or hat-shaped and is called the pileus.

VEIL.—A most striking feature in a few species that have pilei is a thin, net-like membrane that hangs from under the pileus and spreads out as a net around the stem. It is called the veil (or more correctly the indusium) but we prefer to call it the veil.

HISTORY OF PHALLOIDS.

We can not write the history of the phalloids because it is not known. There are only five countries in the world where the phalloids are well known, viz: Europe, the United States, Brazil, Java, and Ceylon. Most of the mycological writers have lived in Europe and the United States, and the easy, conspicuous fungi such as the phalloids are well known. In Java most excellent accounts of the phalloids have been written by Penzig, and in Brazil by Moeller. In the United States a good account of the phalloids of Texas was published by Long, and in Hawaii by Cobb.[1] Very recently—in fact, since this pamphlet was in the printer's hands—we have had an excellent account of the phalloids of Ceylon, by T. Petch. Aside from these five papers, however, most of the work on the subject has been in the line of new species exploitation.

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[1] Mr. Cobb marred his paper by discovering some "new species" that were only new to him; otherwise, his paper was most excellent.

If a census were taken of the individual specimens that have reached Europe from foreign countries, probably more than one-half have been discovered to be "new species." Most of these new species finally gravitate where they belong, into the trash pile known as synonyms. Professor Fischer, of Berne, Switzerland, has done good work in disposing of a great many of them. We shall help the subject along to the best of our ability in one of our appendices.

NAMES OF PHALLOIDS.

Like all objects of natural history, phalloids have Latin names, and in addition to each is usually appended a personal name, primarily designed to tickle the vanity of some individual. Under this system they have never acquired any stable names, for each person who writes about them is chiefly interested in getting up new names to which to append his own. By this means the names of phalloids (like all fungi) have been shuffled about like a shuttle-cock. There are only forty-nine phalloids that are at all well known, and fifty-eight more or less vague and often inaccurate accounts and forms. These one hundred and seven species have two hundred and ninety-nine different names. One of them alone. Phallus indusiatus, has twenty-four different names. It is customary in "scientific" monographs to rake up all these various combinations, tabulate them, usually in chronological order, append with great minutiæ the various promoters of these names, and when finished the result is so largely personal it resembles the society notes in a daily newspaper. We present in an appendix (page 77) an alphabetical list of the names which in our opinion have no value, to the number of 192, and in our Index (page 96) the names we have adopted, to the number of 107. Every writer should, of course, use a nomenclature that expresses his views of how the various species are most naturally grouped into genera. And, where changes are advisable in an author's arrangement, it is at best unfortunate, if he is using a system of writing his own name after such changes, as it may give the impression that this is perhaps the strongest reason for the change. We have made but very few changes and have found it necessary to discover but one new genus.

THE STATE OF PHALLOID KNOWLEDGE.

The phalloids of Europe (and there are but six species in Europe) are, with perhaps one exception, well known. The same can be said to-day of those of the United States, though, owing to the vague manner in which several of them were exploited, it is only in recent years that any clear, definite idea has been obtained of them. Taking into account those that occur in both countries, this includes fourteen species and forms. The first foreign paper in which the phalloids were well presented was only ten years ago, an account of the species of Java, by Penzig. In this paper sixteen species and forms were considered, and at least fourteen were well illustrated. Then there appeared a paper on the phalloids of Brazil, by Moeller, in which nine species were well illustrated. Recent writers, and this includes both Penzig and Moeller, have had the benefit of photography, the best method of illustrating a phalloid. Previously the illustrations were mostly made up from dried specimens or copied from sketches, which gives results, sometimes very good, but often more or less doubtful, sometimes very vague and amusing, and in a few instances they seem to be pure fakes.[2]

There have been a number of compilations similar to this pamphlet, in which the literature has been raked over, and the supposed species arranged with their names more or less shuffled around. This, however, is the first in which all the pictures have been brought together. The first crude attempt was by Ventenat, in presenting one of the first foreign species. Then Fries'

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[2] We know two or three in Europe that in our belief come under this head, and one in America.

Systema (1823) at which time nine foreign species had been figured, and four in Europe, or thirteen in all, and one of the European was a freak. Excluding the freak, all twelve of these species are recognized in this pamphlet, nine of them under the same names as used by Fries. The next general compilation was by Schlechtendal, about fifty years ago. In the meantime, the new species hunters had been quite busy, and Schlechtendal succeeded in finding forty-five species, and he seems to have taken practically all of them at their face value, nor did he indulge in inventing new genera in order to change the names. It is an evidence of the "progress" that since that time, nearly fifty years ago, not an iota of information has been added nor another specimen recorded as to twenty-seven of his forty-five species. Some of them have been discarded as being worthless on their face, but those of the twenty-seven that are retained and known to-day are included in this pamphlet on exactly the same knowledge (?) that Schlechtendal had when he wrote fifty years ago. The next work was by Professor Fischer, in 1886, a compilation of the species described and numbering seventy-six, including the doubtful ones. Practically the same species were included in Saccardo (vol. 7) two years later. After making these compilations, Professor Fischer began his real study of the subject. First, he visited Paris and wrote his first Untersuchungen in 1890, then he visited London and Berlin and wrote his second Untersuchungen in 1893. A third Untersuchungen, principally to include the work of Penzig and Moeller, was issued in 1900. Professor Fischer has studied practically all the specimens in the museums of Europe and the result of his studies has been the rejection of many of the species included in his earliest work, and the reduction of others to forms or varieties. Of the seventy-six species included in his first work, only twenty-three stand as original and good species, and twenty-eight are doubtful. In addition, twenty-eight new species have been added, mostly the work of himself, Hennings, Penzig, and Moeller. This makes a total of fifty-one species, recognized as "good" by Professor Fischer, and twenty-eight doubtful, or a total of seventy-nine.

I have worked over practically the same ground as Professor Fischer, the same museums, and I am in very close accord with him as to the species. As are all who have had the opportunity to see specimens from many localities, Professor Fischer is very liberal in the treatment of species; more so than I, for I maintain a number in this pamphlet that Professor Fischer refers to synonymy. I have not refused to recognize any "new species" that has been exploited in an intelligent manner and that was accompanied by a drawing or photograph showing any material difference. The twenty odd phalloids in this pamphlet, in addition to those recognized in Professor Fischer's latest work, are mostly those that he has referred as forms.

I decline to recognize the alleged "new species" that have been proposed with so much verbosity and so little illustration. No man can give any idea of a phalloid by a mere word description, whether he writes in English, French, German, Chinese, or Pidgin Latin, and it is time this fiction was wiped out of our "literature." In these days of "law-makers" there ought to be a law with a heavy prison penalty for any one who engages in such work. I refer to them in the synonyms as "nomina nuda," although it is a paradox to so call things exploited with so much verbosity.

THE WORK IN THIS PAMPHLET.

We have included in this pamphlet the best illustration known of each phalloid that we recognize. We consider the study of phalloids largely a picture study, and our readers can take these illustrations and form an opinion as to the identity of any phalloid they find with almost as much advantage as if they had access to the types.

In our text we have not entered into minute descriptions, believing that in most cases it is superfluous. We have given the leading facts as to the occurrence of the various species as far as known, the color, and have pointed out the manner in which they differ from each other. We have presented the best picture possible of each species, and in many cases the copies of the original illustration from which the description was drawn. With these facts before him, the reader can learn just as much about the phalloid as the author who named it and wrote the "description."

CLASSIFICATION.

There are relatively few genera of phalloids, and they are classed by their general form, so that the classification is a very simple matter and will be readily understood by the following table and the illustrations. As a matter of convenience we divide them into five groups:

1st, The simple stem section. Gleba borne directly on the upper portion of a simple stem, or on a pileus borne on top of a simple stem.
  Gleba borne on the outer surface of a special pileus.
    Pileus even, rugose, or reticulate .... **Phallus**
    Pileus surface strongly convolute .... **Clautriavia**
    Pileus of a lamellate structure, the gleba covering the plates.... **Itajahya**
  Gleba borne directly on the upper portion of the stem. No special pileus.
    Smooth, even .... **Mutinus**
    Rugose, papillate or uneven .... **Jansia**
    Gleba covering a rudimentary network .... **Floccomutinus**

2d, The lobed section. Gleba spread over or on the inner surface of free arms or lobes at the apex of the stem.
  Arms free at the apex of a columnar stem .... **Lysurus**
  Stipe, a flaring tube, the limb lobed .... **Anthurus**
  Stipe bearing a disk-like expansion, the limb divided into lobes or
    segments .... **Aseroe**

3d, The columnar section. Receptacle consisting of simple, vertical columns, united at the top and bearing the gleba on the inner sides.
  Sessile .... **Laternea**
  Stalked .... **Pseudocolus**

4th, The clathrate section. Receptacle in the form of a clathrate or latticed structure.
  Sessile, simple .... **Clathrus**
  Stalked, receptacle a simple net.
    Borne on a simple stem.................................... **Simblum**
    Borne on columns that are united into a hollow tube at the base.... **Colus**
  Stalked, the net-work having knob-like projections .... **Kalchbrennera**
5th, Anomalous genus, without volva......................... **Phallogaster**

THE GENUS PHALLUS.

This is the original genus of Europe and from whence the name of the order is derived. The genus is very simply characterized by having a pileus, borne on the top of a simple stem. All species of the genus are very much alike as to shape, but differ in color, in size, in smoothness or roughness of the pileus, and in various developments of a veil. This veil, which is only known as rudimentary in the related genus Mutinus, varies much in different species of Phallus, and even in the same species in degrees of development. Some species have only a rudimentary veil, others a distinct but very short veil hidden under the pileus, or slightly protruding, others a very conspicuous, long veil. The gleba covers the outer surface of the pileus. In a few species this pileus is even, or relatively smooth; others reticulate, or ridged. Usually the pileus has an apical collar that is entire or perforate, sometimes in the same species. Some species are devoid of this apical collar, and one, Phallus subtilis, has been erected into a genus principally on this account. We would divide the species into two sections, as Professor Fischer does, though we would not designate these sections by distinct generic names. We think the old name Phallus should cover them both.

Section 1, Veil short or merely rudimentary. Section 2, With distinct veils. Each section is also subdivided on the character, whether the pileus is relatively smooth and even, or is reticulate with ridges.

SECTION I. VEIL SHORT OR MERELY RUDIMENTARY.

PILEUS STRONGLY RETICULATE.

PHALLUS IMPUDICUS (Fig. 1).—It seems to me to be useless to use any space in describing Phallus impudicus. It is such a well-known plant, even to every peasant in Europe, and, besides, our photograph is the best description. The stem is white and the pileus has strong reticulations, not shown in our photograph where they are covered with the gleba. Phallus impudicus is the original phalloid, and the most common one of Europe. It extends throughout Europe. In the United States we do not have the type form of Europe, but a pinkish variety known as Phallus imperialis. In Japan, Phallus impudicus (the type form I judge from the drawings I have seen) is common. In Australia it is rare, if it occurs at all. Only one collection is known, now at Kew, which does not accord exactly with the European plant, but is close to it. Phallus impudicus probably occurs in other countries, but the above are all that are surely known.

Forms.

PHALLUS IMPERIALIS.—This form differs from the type form only in having a pink volva and in its distribution. I am told that in France it has a different habitat, and a different odor. I can not vouch for that. At any rate it is a rare plant in Europe, widely distributed but infrequent. In the United States it is the only form of Phallus impudicus we have. It is common in the West—Colorado, Southern California, and Texas. East of the Mississippi, I know of but one station, Washington, D. C. From its distribution it is evidently a plant that favors a warm climate and a sandy soil.

PHALLUS COSTATUS (Fig. 2).—This species, which was described from Java, is evidently similar to Phallus impudicus, and seems to me is better considered as a form. It differs chiefly in having more pronounced, almost winged reticulations to the pileus, and the substance of the pileus is described as yellowish-white.

PHALLUS TENUIS (Fig. 3).—A small yellow-species, native of the Orient. It can easily be known from all others of the section by its yellow color, both of stipe and pileus, and in addition by its

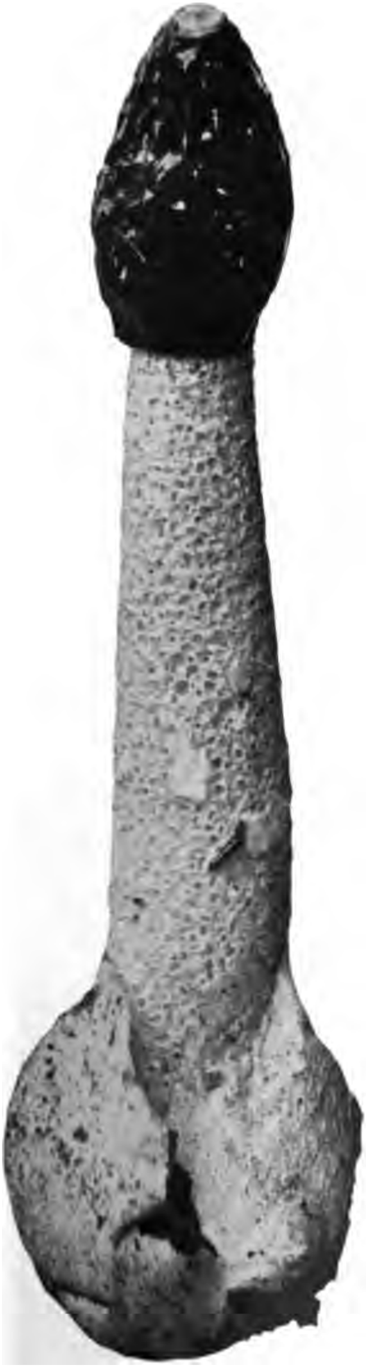

Fig. 1.

PHALLUS IMPUDICUS.

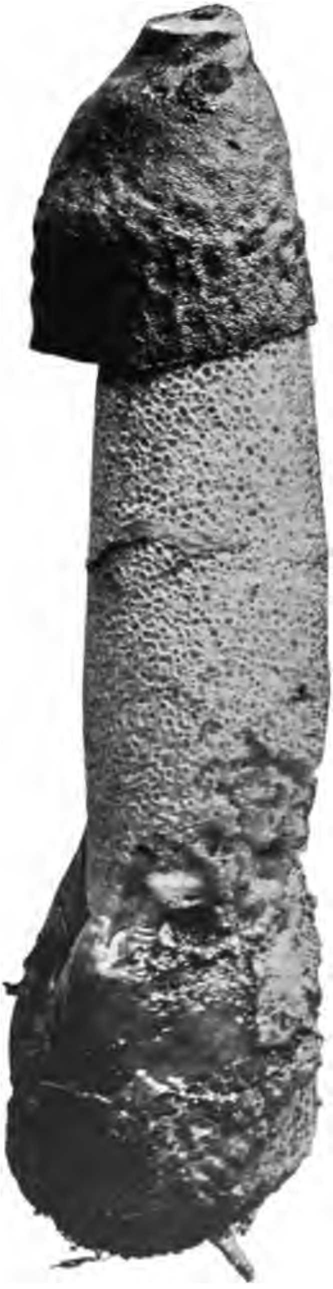

Fig. 7.

PHALLUS RAVENELII.

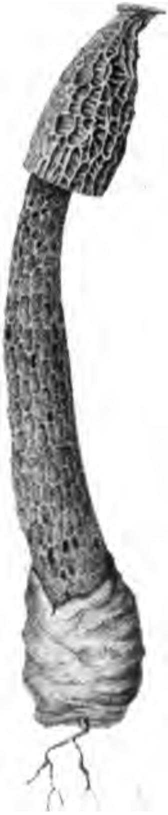

Fig. 3.

PHALLUS TENUIS.

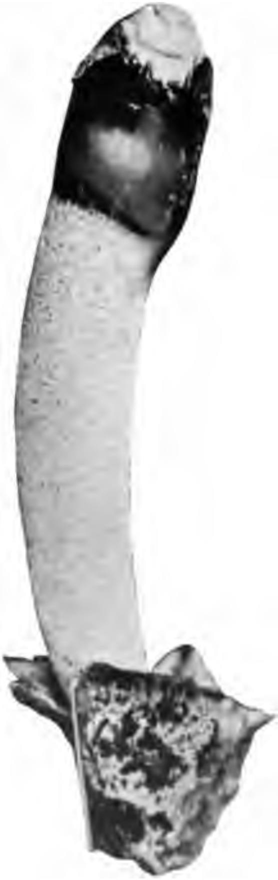

Fig. 5.

PHALLUS RUBICUNDUS.

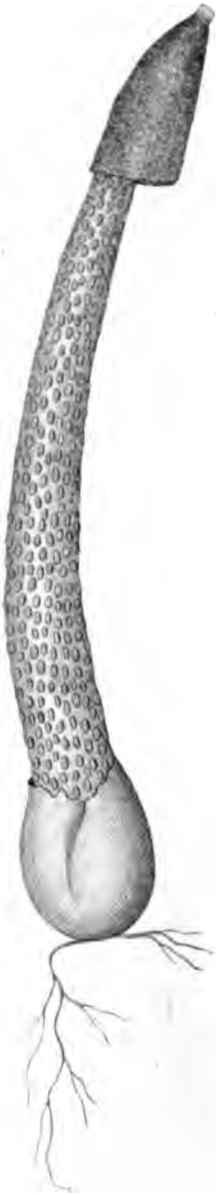

Fig. 9.

PHALLUS RUGULOSUS.

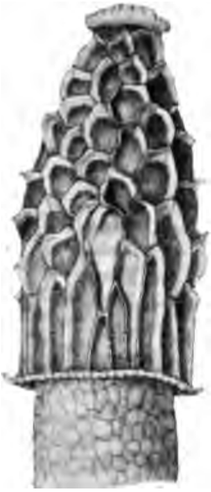

Fig. 2.

PHALLUS COSTATUS.

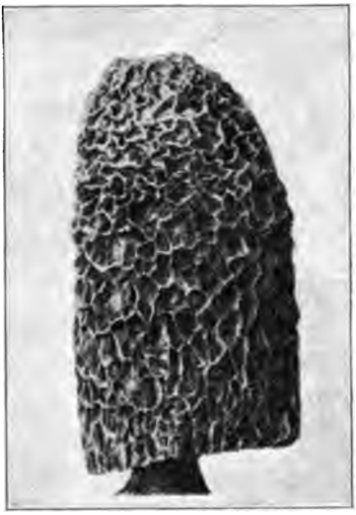

Fig. 4.

PHALLUS FAVOSUS.

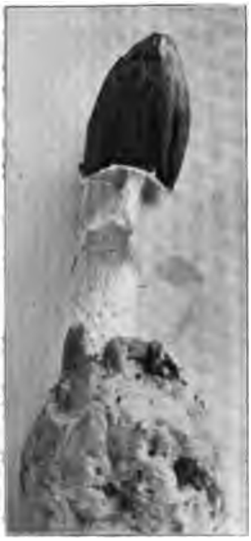

Fig. 8.

PHALLUS RAVENELII.
(reduced)
(With protruding veil.)

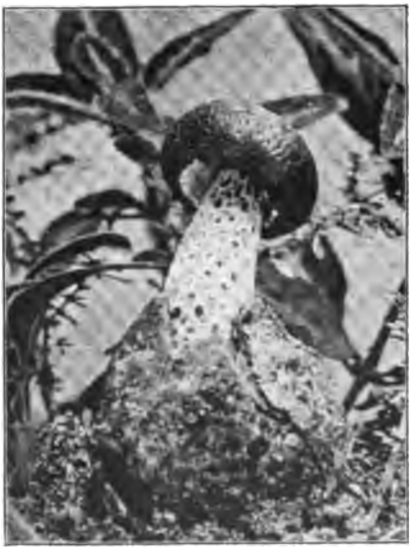

Fig. 10.

PHALLUS GLUTINOLENS.

small size and thin substance. The dried specimens appear like a thin skin. Phallus tenuis was originally from Java, but must be a rare species there, as Dr. Bernard does not record it. It occurs also in Ceylon (specimens at Kew), and Professor Kusano has found it (very rarely) in Japan. In the latter country it grew on rotten wood. The stipe of the Javanese form is yellow, but in Japan it was represented as white. The original description makes no mention of the plant having a veil, but one of Penzig's figures shows a rudimentary veil hidden under the pileus.

PHALLUS FAVOSUS (Fig. 4).—This species, also known from Java, and rare there, is intermediate between Phallus impudicus and Phallus tenuis. With the large size of the former, it has a relatively thin pileus and a pale, yellowish stem. The substance of the pileus is also pale, but not so clear yellow as that of tenuis. It is only known from the original record.

PILEUS RELATIVELY SMOOTH OR MERELY RUGULOSE.

PHALLUS RUBICUNDUS (Fig. 5).—Stem, red. Pileus, red, smooth, or slightly rugose, covered with the greenish gleba. Apex, perforate, or sometimes imperforate. This is the only red species of the genus Phallus that we have, and it is widely distributed. It occurs in abundance in certain localities in our Southern States and many other warm countries. It has been named from India (Phallus aurantiacus), Africa (Phallus sanguineus), Australia, Hawaii. I have seen a drawing from China, and it is reported from Japan. In Hawaii it has been shown to be the cause of a destructive root disease of the sugar cane. When we get a better knowledge of the distribution of our phalloids, I think that Phallus rubicundus will be found in almost all sugar countries. I believe there is only one red Phallus. Forms from various countries seem to differ in being slender or obese; the pilei, in being truncate or acute, perforate or imperforate, with an apical collar or without, but the material is not at hand from which to form any opinion as to the systematic value (if any) of these differences.

Forms.

PHALLUS GRACILIS (Fig. 6).—Phallus rubicundus varies chiefly in stature. Slender forms have been called Phallus gracilis. For a long time the characters of Phallus rubicundus were not known other than the fact that we had a red Phallus in our Southern States. A recent article of Professor Long has given us a clear idea of its characters and convinced us there is no distinction between it and Phallus aurantiacus as it has generally been known in foreign countries.

PHALLUS RAVENELII (Fig. 7).—This is the most common phalloid of the United States, there replacing Phallus impudicus of Europe. In general appearance it resembles Phallus impudicus, but has a smoother pileus and a veil, usually short and hidden under the pileus. Rarely, however, it occurs with a protruding veil (Fig. 8). Usually Phallus Ravenelii grows on logs in the woods, sometimes on

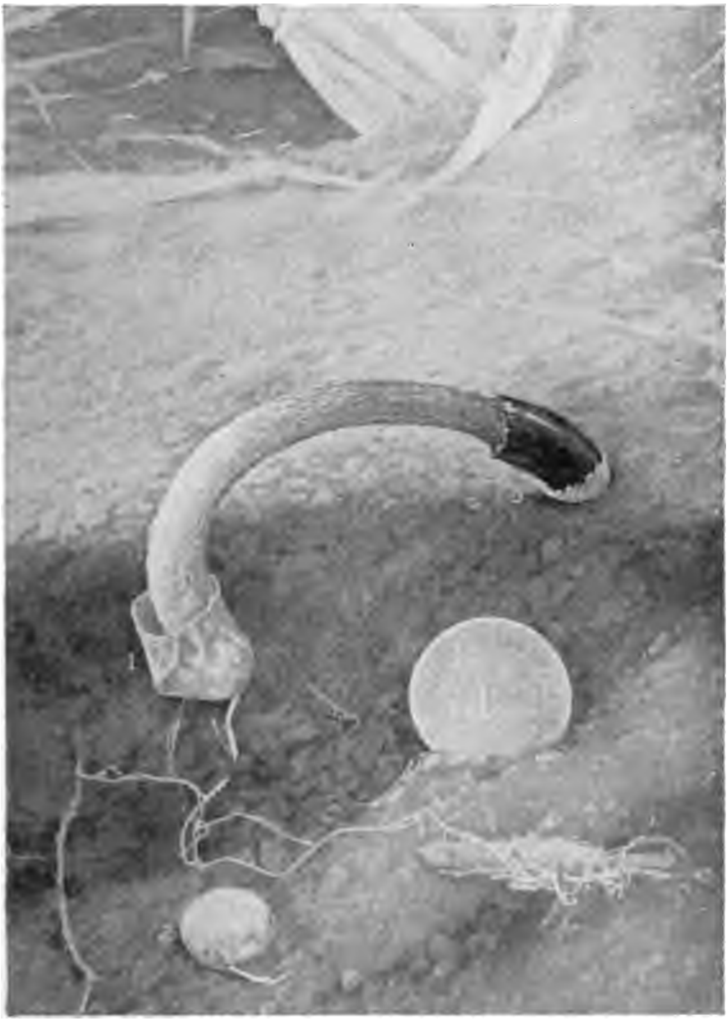

Fig. 6

PHALLUS GRACILIS.

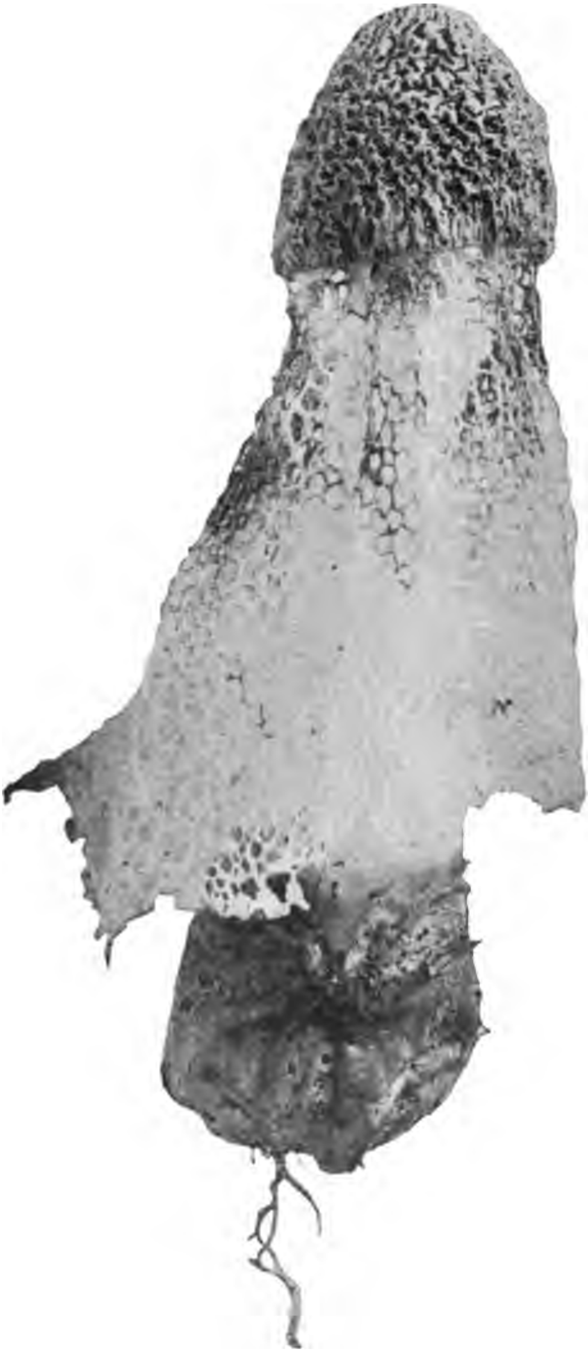

Fig. 12.

PHALLUS INDUSIATUS.

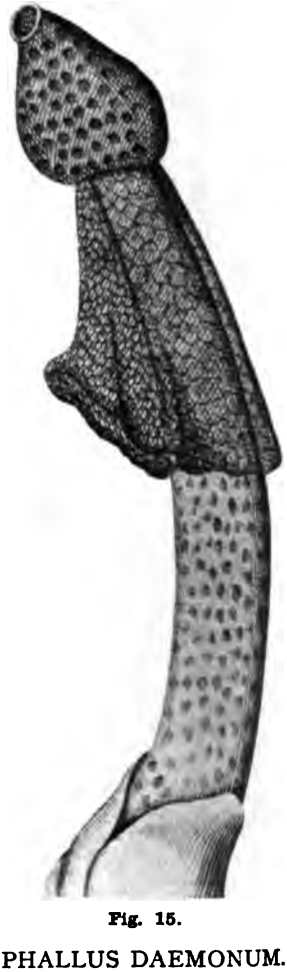

Fig. 15.

PHALLUS DAEMONUM.

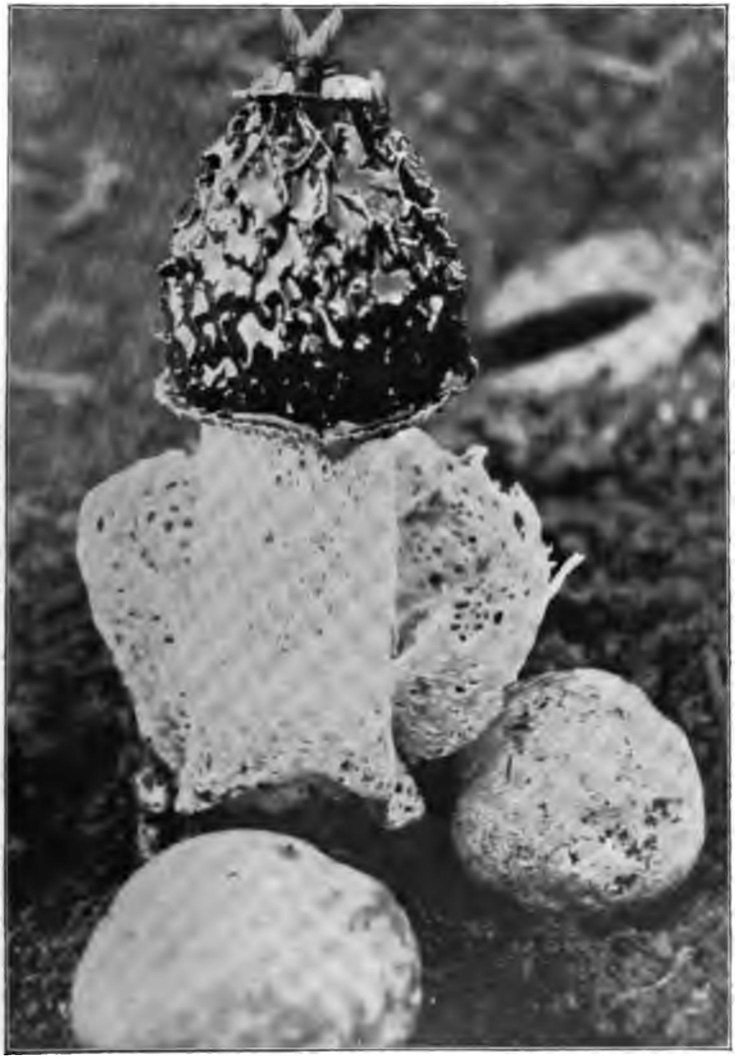

Fig. 16.

PHALLUS DUPLICATUS.

the ground, and sometimes it develops in the greatest abundance on old piles of sawdust. The species is only known from the United States and Canada.

PHALLUS RUGULOSUS (Fig. 9).—Pileus, thimble-shaped, almost even or slightly rugulose, with a small, globose, apiculate collar. Color, dark. Veil, none. Stem, pale reddish. This species was described from alcoholic material, and is known only from Japan, where it is reported to be common. I have seen a drawing from Professor Kusano. As I understand it, the substance of the pileus is not red, otherwise the plant seems close to Phallus rubicundus. I should not be at all surprised if it develops that it is a slender form (gracilis) when the color of the pileus substance is known.

PHALLUS GLUTINOLENS (Fig. 10).—This is a unique species of Phallus, known only from Brazil. It has white stipe and no evident veil. The pileus is smooth and differs from all other species in the *globose* shape. It has only been observed by its original author, who gives us a good photograph of it.

PHALLUS SUBTILIS (Fig. 11).—This Brazilian species has only been illustrated by a sectional drawing. A photograph would not show any marked difference from any other small Phallus. It was erected into a separate genus because the pileus has no apical collar, and a section shows it to be formed of radiate plates. It is also somewhat gelatinous in its nature. It is only known from Brazil and from the work of the original author.

SECTION 2. VEIL EVIDENT, USUALLY STRONGLY DEVELOPED.

PILEUS STRONGLY RETICULATE.

PHALLUS INDUSIATUS (Fig. 12).—Pileus broadly campanulate, strongly reticulate. Veil strongly developed, of small, slender threads and large meshes. Color of stipe and veil white. This is the most common phalloid of all tropical countries and is found in quantities in all of the museums. We have noted specimens from Australia, India, Andaman Island, Java, Ceylon, East Africa, Mauritius, Mexico, Brazil, British Guiana, French Guiana, South Africa, Surinam, New Caledonia, Cuba, Tonkin, Philippines, Borneo, Jamaica. We have received it from a number of correspondents and have collected it (common) in Samoa.

Forms.

Phallus indusiatus varies in the tropics, chiefly in the shape of the pileus and the veils. Also in color, I think, and I suspect that in time it will not be found practicable to keep distinct Phallus callichrous and Phallus multicolor as other than color forms. Usually the veil is flaccid, but at other times more rigid. Sometimes it is united above into a distinct membrane. These forms seem to have a geographical significance, but so little is known that at present it is not possible to designate the distribution of the various forms. In Samoa, where I have observed it common, it never takes anything but the type form.

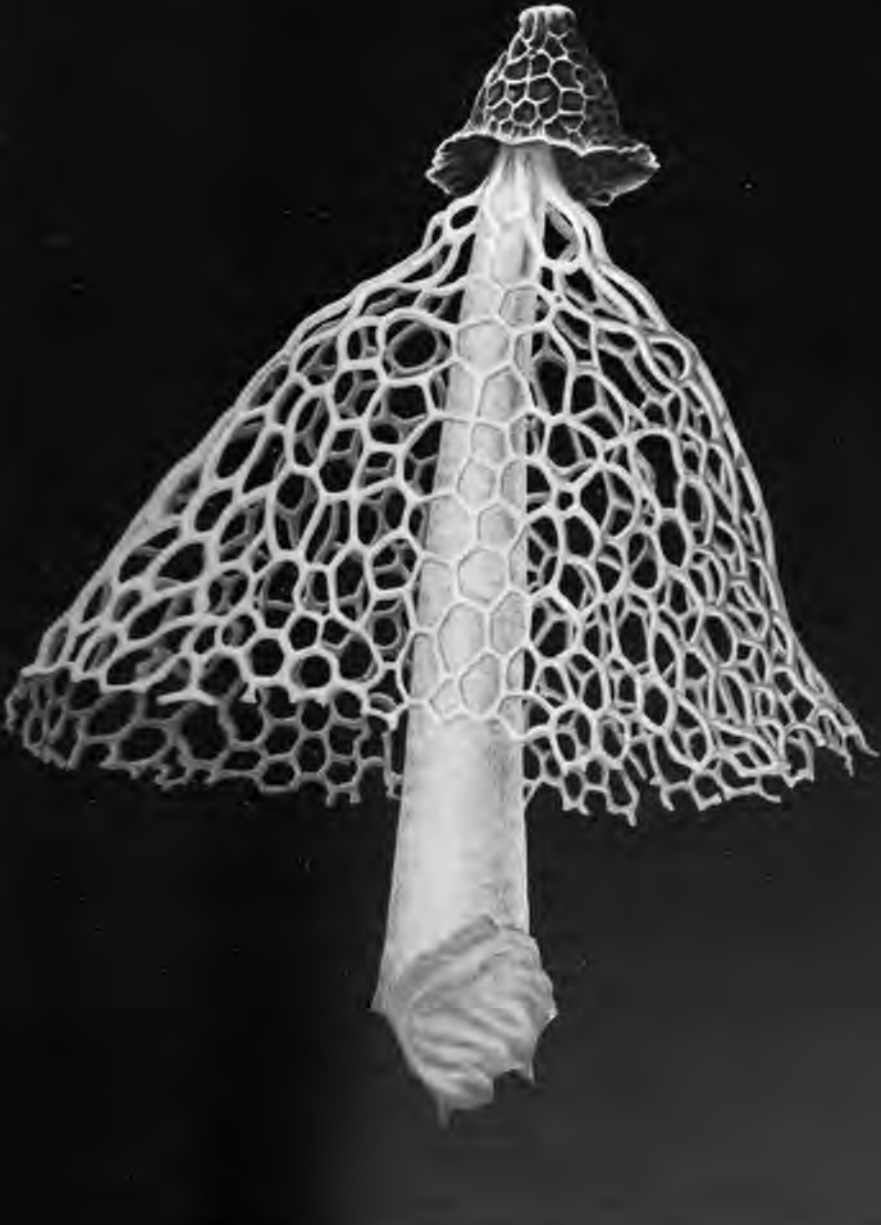

Fig. 13.

PHALLUS MOELLERI.

PHALLUS ROSEUS.—A form with a pink veil, which is at Paris, from French Guiana. It is also reported from Java.

PHALLUS MOELLERI (Fig. 13).—A form with a narrow pileus and rigid, spreading veil, as illustrated by Alfred Moeller, from Brazil. Professor Moeller states that in Brazil it runs into the type form so intimately that it is not practicable to keep it distinct.

In the recent article by T. Petch, it is stated that this rigid veil is not a form even, but the *normal* condition of the veil of Phallus indusiatus when first expanded and before the sun strikes it. That which I have taken for the type form is a condition after the veil has been wilted by the sun. I have never observed this (in Samoa) nor should I have suspected it, as they seem so different, but Professor Petch undoubtedly knows. In the interest of truth then "Phallus Moelleri" must be deleted, even as a form.

PHALLUS ROCHESTERENSIS (Fig. 18).—A form with an elongated thimble-shaped pileus and narrow, cylindrical veil is found at Kew, from Australia. It has been illustrated under the erroneous name, Phallus merulinus.

Color Forms.

There are two very showy tropical phalloids that in shape and other characters appear to be the same as Phallus indusiatus, but have bright colors. At the present time we can characterize them by their colors, but when the phalloids come to be well known, I think so many intermediate colors will be found that color characters alone will not be held to constitute species. T. Petch finds these color forms abundant in Ceylon, and states that they grade into the white form so intimately that it is not possible to keep them distinct even as forms. I am satisfied, however, that they have a geographical significance. They do not occur in Samoa, and Mr. C. B. Ussher, who has observed the species in tropical Africa, informs me that they are absent there.

PHALLUS MULTICOLOR (Fig. 14).—This was originally from Australia, but has been recently found and photographed from Java. Pileus orange red, veil bright lemon yellow, stipe lemon yellow, volva pink, mycelium purple. The characters, if they are real characters, of the species are the colors as stated above.

PHALLUS CALLICHROUS.—This appears to be different from multicolor only in the coloration. The pileus is orange, the veil and stipe white. It has never been illustrated, but probably could not be distinguished by a photograph alone from either multicolor or indusiatus. It was originally named from Brazil, but similarly colored plants have been observed in Java, Africa, and Australia.

PHALLUS DAEMONUM (Fig. 15).—This, which was the original foreign phalloid, illustrated from the island of Amboy, was published one hundred and sixty years ago.[3] All that is known of it to this day is the original, crude figure that we present. It seems quite distinct from the usual form in its punctate rather than reticulate pileus, if that proves to be a character of the plant and not of the figure only.

PHALLUS DUPLICATUS (Fig. 16).—Pileus with a strongly developed apical collar and strong reticulations. Veil long, white, of

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[3] It has therefore strong claims to be taken as the specific name for the species as proposed by Professor McGinty. There are two objections to it, however. First, it may be the "type" in the perverted sense that the word "type" is usually used, but it does not seem to be the typical form as the plant usually occurs. Second, it is not advisable to use so familiarly the name of His Satanic Majesty.

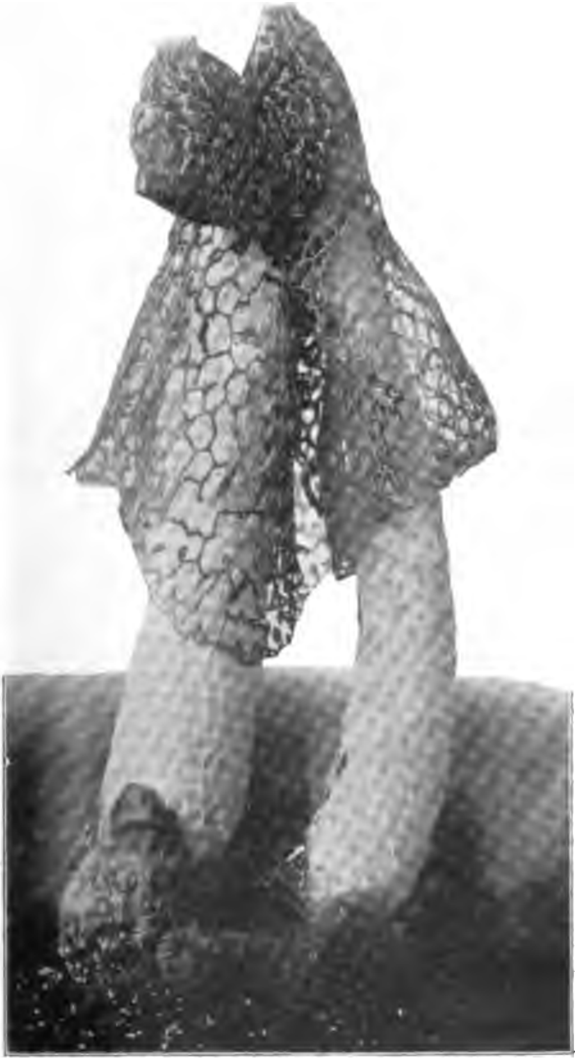


Fig. 14.

PHALLUS MULTICOLOR.

thick threads, which in alcoholic specimens contract and form almost a membrane. This is a common plant in the United States and is so close to the tropical species it may well be considered a temperate region form of it. However, it differs in the nature of the veil and the usual shape of the pileus, and I am convinced that it is as distinct as species generally are. The veil (which is torn in our figure) is a conspicuous feature of the plant.

Forms.

We would be disposed to consider related plants with a similar veil as forms of this species.

PHALLUS SUBUCULATUS, of Algeria, which was inaccurately figured, is, we think, a form of it.

PHALLUS MAURITIANUS (Fig. 17).—This form, which we have received in alcohol from Chas. O'Connor, of Mauritius, we feel is worthy of a separate designation as a form. It differs from the typical plant in the nature of the reticulations of the pileus, and is better shown in our photograph than we can tell it.

Note.—We formerly included in this section, under the name Phallus irpicinus, the only known phalloid with a well developed veil and rugulose pileus. It was proposed as a new genus (or a new section) Clautriavia, on account of having the pileus minutely convolute. We were not disposed to consider that of generic value, until recently when we saw at Berlin a New Guinea species with such a *strongly convolute* pileus, and such a marked character that we now feel that the genus Clautriavia should be maintained. Compare Clautriavia merulina on the next page.

IMPERFECTLY KNOWN SPECIES OF THE GENUS PHALLUS.

Many phalloids are known (?) only from old cuts based mostly on dried specimens and, in some instances, fertile imaginations. Naturally they are of not much importance for no one ever finds them again, but there is no way of getting rid of them. The genus Phallus has been especially favored (?) in this regard. We give a short synopsis of them here and have relegated the (alleged) pictures to an appendix.

PHALLUS DISCOLOR (Fig. 95).—From Australia, if correctly illustrated (with an emphasis on the "if"), is an intermediate plant connecting the genera Phallus and Mutinus. It was alleged to have the pileus adnate at the base to *the top* of the stem.

PHALLUS CALYPTRATUS (Fig. 96).—From Australia. Appears to be based chiefly on an accidental mass of gleba dried on top of the pileus.

PHALLUS RETUSUS.—Originally exploited as a new genus, it is reported by Professor Fischer (who has seen the "type") as an obese form of aurantiacus. The figure has no resemblance to aurantiacus, but it does not follow that the plant has none. It was from Australia.

PHALLUS CAMPANULATUS (Fig. 98).—Known only from the figure (Uruguay). The little cup at the base is not the volva, but the "inner" volva. It seems to have an even pileus and be close to Ravenelii, though nothing is known as to its veil. No specimen exists.

PHALLUS CELEBICUS (Fig. 99).—Said to grow in the Celebes and to have a whitish pileus and a yellow stem. It appears from the published account to be very close to Phallus rubicundus.

PHALLUS CANARIENSIS (Fig. 100).—If the figure is correct it is a peculiar little species with a slender stipe and large, rugulose pileus. Both

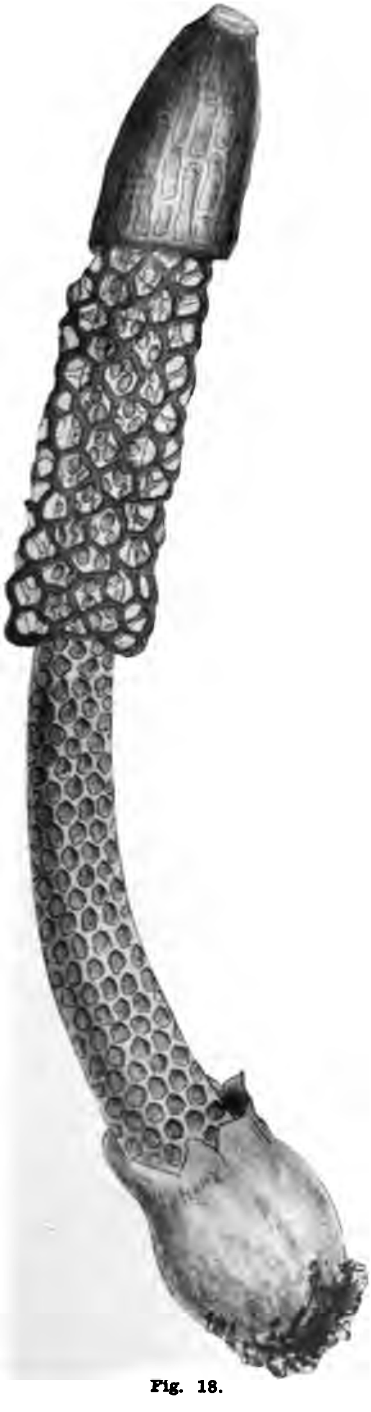


Fig. 18.

PHALLUS ROCHESTERENSIS.

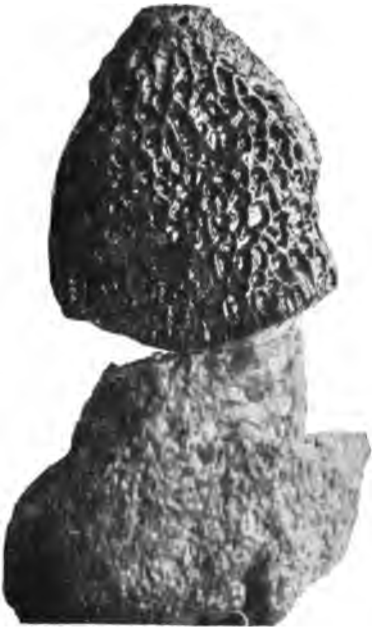


Fig. 17.

PHALLUS MAURITIANUS.

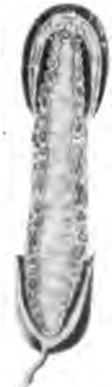


Fig. 11.

PHALLUS SUBTILIS.

(Section.)

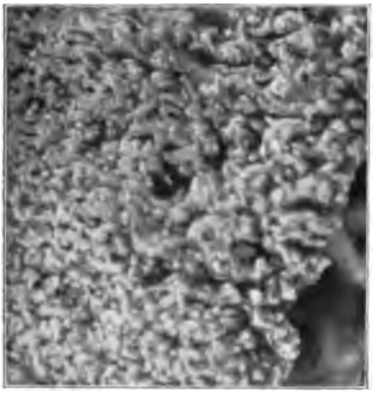
pileus and stipe are rose colored. It was from the Canary Islands. I have found no type.

PHALLUS FARLOWII.—This from alcoholic (or dried?) material from Brazil has never been illustrated. It is said to have a membranous veil, otherwise it is very close to Phallus indusiatus.

PHALLUS QUADRICOLOR (Fig. 102).—I think is probably based on a specimen of Phallus multicolor which has lost its veil. From Australia.

THE GENUS CLAUTRIAVIA.

This genus is characterized by having the surface of the pileus convoluted in folds, the gleba covering the folds and permeating the interspaces between them. Our figure (which is an enlargement six diameters) will give a clear idea of this structure. The original species, Clautriavia merulina, which is a frequent plant in Java, Ceylon, and the East Indies, in general (probably) has very minute folds, so that the surface to the eye appears even, but a recently discovered species of New Guinea, Clautriavia Lauterbachii, has the folds so strongly convoluted that in the egg the pileus appears to be a crumpled veil covered with gleba.



CLAUTRIAVIA MERULINA (Fig. 19).—This species has the general appearance of being a Phallus. The pileus, however, instead of being a plain or reticulate membrane with the gleba on the outer surface, consists of minutely convoluted folds, the gleba permeating the depressions between the folds. It has long been known as a common species in Java.[4] Recently T. Petch has published that it is abundant in the grounds of the Botanical Garden at Peradeniya, Ceylon. When the truth of the subject is known it will probably be found to be generally distributed in the East Indies and neighboring countries.

CLAUTRIAVIA LAUTERBACHII (Fig. 20).—This species, which has a most remarkable structure, is unfortunately known only from some undeveloped plants from New Guinea. The pileus in the

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[4] Berkeley named the plant Phallus merulinus, many years ago, and while he gave no formal description of it (in pidgin Latin) he characterized it in an unmistakable manner, it appears to me now. Fischer incorrectly referred the name as a synonym for Phallus indusiatus, and Cooke illustrated a form of Phallus indusiatus of Australia under Berkeley's name. Patouillard discovered it to be a "new species" from Java, and named it irpicinus, which name we have previously used, and would continue to use if it had any application to the plant. We adopt Berkeley's name, not on the grounds of "priority," but suitability, believing that when a plant has two names, one very good and one very bad, the better should be chosen.

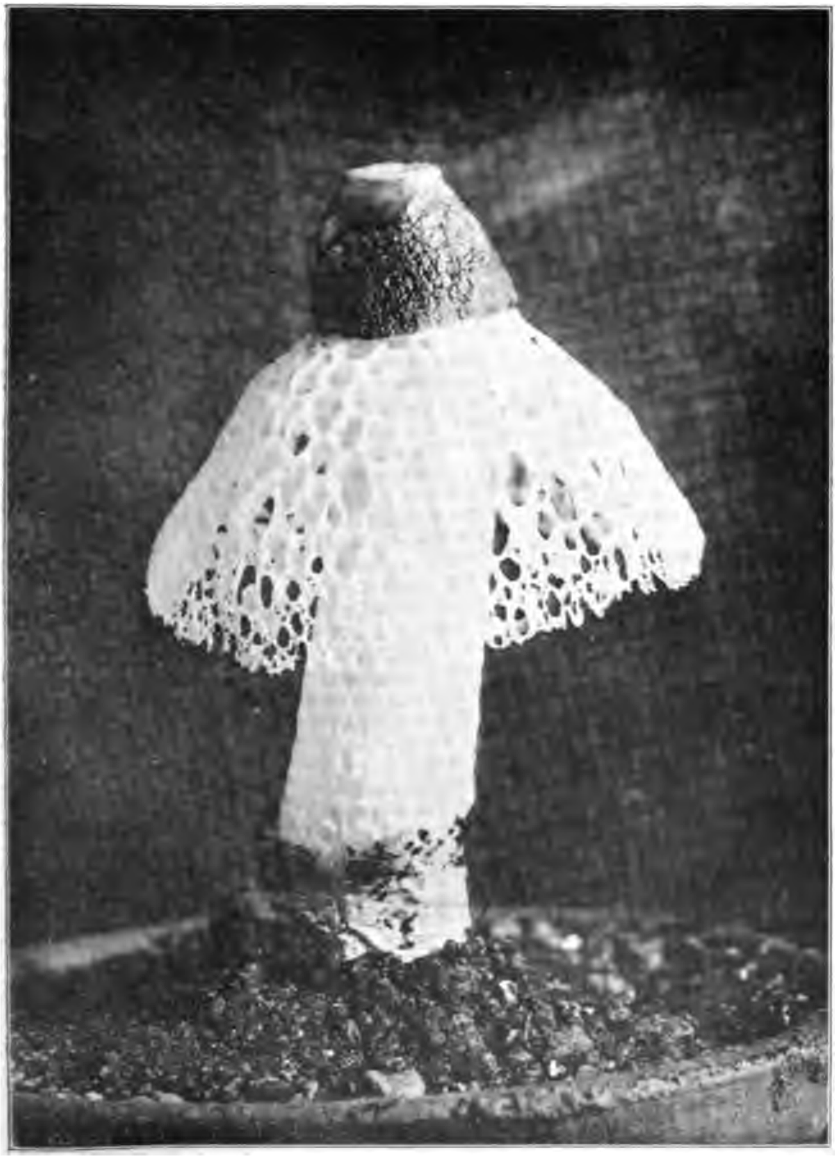

Fig. 19.

CLAUTRIAVIA MERULINA.

egg is a strongly folded and convolute membrane resembling at first view a crumpled veil. What form it takes in the developed plant is not known, but it is probable that it does not change much, as the form of a pileus is in all known instances well defined in the egg. In addition the volva is covered with wart-like processes, which, while unknown as to any other phalloid, is in my opinion a minor character. The plant is only known from New Guinea, and a photograph of a developed plant is much desired.[5]

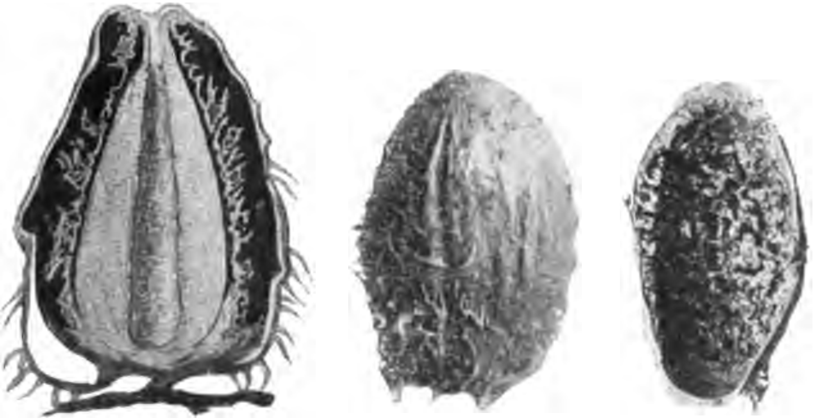

Fig. 20.

CLAUTRIAVIA LAUTERBACHII.

Section by Fischer. Photograph of the volva, also of the folds of the inner face of the pileus.

THE GENUS ITAJAHYA.

This genus in general appearance resembles the genus Phallus, but is quite different in the structure of the pileus. This consists of lamellate plates, the gleba covering these plates, permeating the inner structure of the pileus.

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[5] Until I saw the specimens I had a very erroneous idea of the characters of the plant, and I think they have been inaccurately presented in the published accounts. When Dr. Hennings received these phalloid eggs he sent them to Professor Fischer, who made what impresses me as a very accurate drawing of a section that he returned to Dr. Hennings with the suggestion that it be called Ithyphallus Lauterbachii. We reproduce Professor Fischer's section in our figure (20). Dr. Hennings did not publish Fischer's figure as received, but modified it, showing a "hut" and an "indusium." The plant has but one membrane, which should be called the "hut," as it bears the gleba and is analogous to a pileus. There is no indusium. One of the egg sections at Berlin would at first view seem to have a rudimentary indusium, but on closely examining it I find it is a division of the stem, which in this instance seems to divide above and support the pileus in the manner of a Helvella. The pileus in the egg is so convoluted that my first impression (until I noticed that it bore the gleba) was that it was an indusium, and that here we had a type of a new genus of phalloid which had a veil but no pileus. Dr. Hennings first published it under Fischer's name, Ithyphallus Lauterbachii. Afterwards he republished it as a new genus Echinophallus, basing it principally on the protuberances of the volva, a minor character, in my opinion. The main character of the plant, the strongly folded and convoluted pileus, is unique in this species and establishes, for me at least, the validity of Patouillard's genus Clautriavia, based on the same character, though in a much less developed form.

ITAJAHYA GALERICULATA (Figs. 21 and 22).—But one species of the genus is known, which is a native of Brazil, from whence it was well described and illustrated by Moeller. It has since been found there by Father Schupp. Robert E. Fries recently records the plant as common in Argentina, and it is probably frequent and widely distributed in South America.[6] Our photographs and the sectional figure of the pileus are all that are necessary to enable one to recognize the plant.

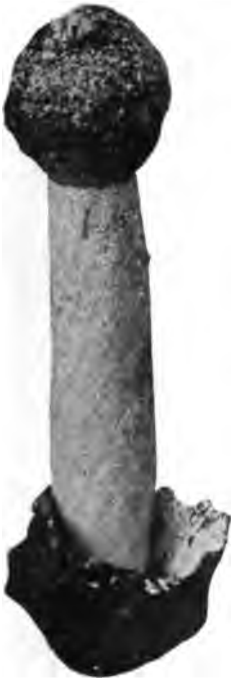

Fig. 21.

ITAJAHYA GALERICULATA.

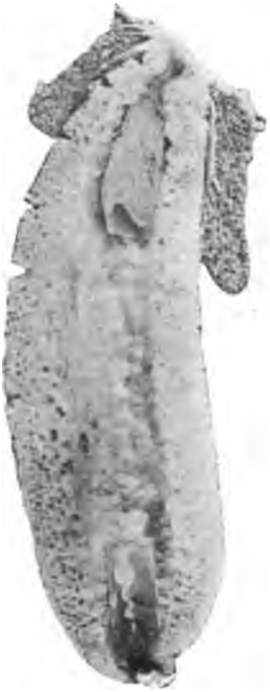

Fig. 22.

ITAJAHYA GALERICULATA. (Section.)

THE GENUS MUTINUS.

This genus is distinguished from Phallus, to which it was formerly united by having no distinct pileus, the gleba being borne on the upper portion of a simple stem. Sometimes the gleba-bearing portion is distinct from the stem, taking somewhat the nature of a distinct pileus, but in other species it is not clearly marked from the stem. The species of Mutinus are all very similar and are distinguished by their general form. All are red, or sometimes have white forms.

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[6] Mr. Fries suggests, not without reason, that it may be the original of Spegazzini's "new genus" Alboffiella, which if true is a prior name. In that case I submit, would it not be a rank injustice and a travesty on science to replace the excellent work done by Moeller, or his name, by the inaccurate work of Spegazzini?

MUTINUS CANINUS (Fig. 23).—This, which is the only species of Mutinus that grows in Europe, has a short, distinct, spore-bearing portion, which is sharply distinct from the stem. I do not know whether it is a constant character, but I have seen alcoholic specimens where the receptacle was abruptly contracted and of a smaller diameter than the stem. The structure of the receptacle is always different, being of small, thick-walled cells, while those of the stem are large and thin-walled.[7] Mutinus caninus is not rare and is widely spread in Europe. In the United States it is much rarer, and while I think it is well authenticated, it occurs principally in the Eastern States. The stem of Mutinus caninus is usually red, though white-stemmed forms have been figured on several occasions.

MUTINUS ELEGANS (Fig. 24.)—In this species there is no distinction between the stem and the spore-bearing portion. It is all one uniform, cellular structure, with no sharp line of demarcation. The form is generally tapering from a thickened base to an acute apex. Mutinus elegans is the most common Mutinus that we have in the United States. It grows in the woods around old logs or soil rich in humus. It is not rare. The color is red or orange.

MUTINUS RAVENELII (Fig. 25).—This species has the same cellular structure as the preceding and has been held to be the same plant. I am satisfied it is distinct in form (usual) and habitat. The shape is club-form, thickened above, and tapering below. The habitat is old fields devoid of woods humus. It is a rare plant in the United States. The color is red.

MUTINUS BAMBUSINUS (Fig. 26). — Receptacle distinct from the stipe, formed of small cells. Color of both stipe and receptacle is red. This, which seems to be the common species of the tropics, is very similar to Mutinus caninus of Europe. However, it has a much longer spore-bearing portion and the color is brighter red. It was originally from Java, but occurs in the Celebes, Brazil, and no doubt in many tropical countries. It has been noted, adventitious, in the hot-houses at Kew.

MUTINUS FLEISCHERI (Fig. 27).—The most obese species of Mutinus known. It has a thick stem and a very short, contracted spore-bearing portion. Its structure is that of Mutinus caninus, of Europe, but it is a much more obese plant. It is known only from Java and is a rare plant there. The color is red.

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[7] This has always been my observation, and my understanding of the essential character of Mutinus caninus. I have recently seen at Berlin alcoholic specimens of eggs and sections of eggs of Mutinus caninus from Europe, where I can not note any difference in the cells of the stem and gleba-bearing portion.

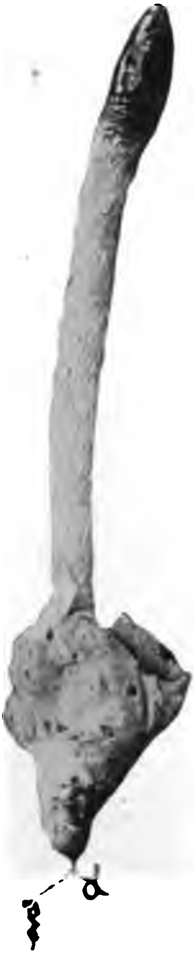

Fig. 23.

MUTINUS CANINUS.

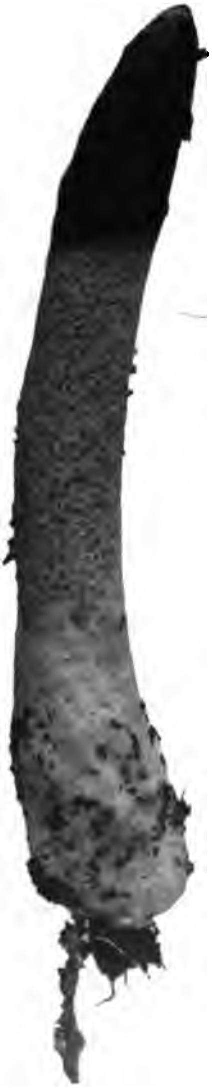

Fig. 24.

MUTINUS ELEGANS.

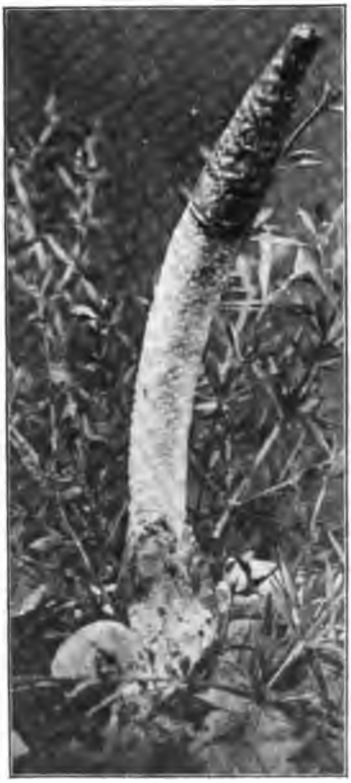

Fig. 26.

MUTINUS BAMBUSINUS.

MUTINUS PENTAGONUS (Fig. 28).—All the previous species of Mutinus have cylindrical stems, but in this species the stem is pentagonal (or sometimes six-angled). The gleba-bearing portion is also strongly fluted, and the gleba is borne on the channels with free edges. In the genus Lysurus the lobes, when young, are connivent, and the young plants of Lysurus Mokusin evidently closely resemble this species. In Mutinus pentagonus I am convinced from an examination of dried specimens that there are no arms, but that the receptacle consists of a single piece. Mutinus pentagonus is known only from Australia, and but scantily there.

MUTINUS XYLOGENUS (Fig. 29).—This is the smallest phalloid known and an idea of its size can be obtained from our photograph, which is an enlargement six diameters. It is only known from a collection made in French Guiana many years ago, and preserved at Paris. It is a question whether it is a Phallus or a Mutinus (cfr. Myc. Notes, p. 336). If a Mutinus, it is not only the smallest species known, but differs from all other species in having a globose mass of gleba.

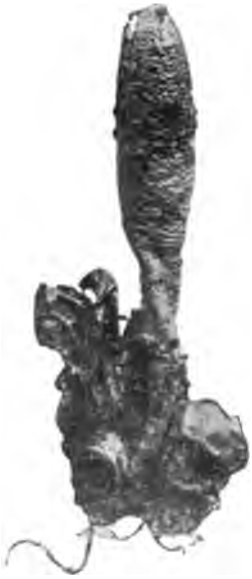

Fig. 25.

MUTINUS RAVENELII.

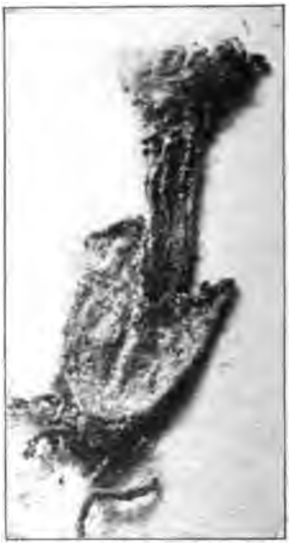

Fig. 29.

MUTINUS XYLOGENUS.
(Enlarged x6.)

DOUBTFUL AND LITTLE KNOWN SPECIES.

The same remarks apply here as under the same head concerning the genus Phallus. Mutinus minimus, Mutinus borneensis, Mutinus proximus, and Jansia boninensis may all prove to be the same plant.

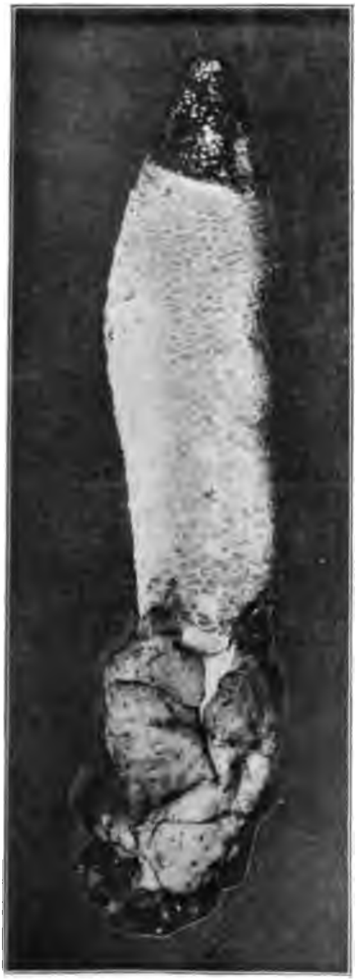

Fig. 27.

MUTINUS FLEISCHERI.

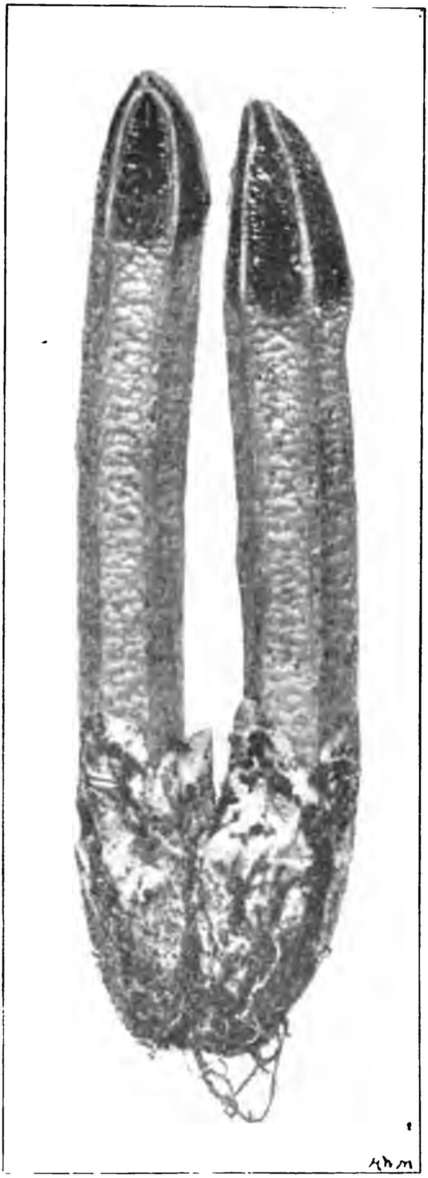

Fig. 28.

MUTINUS PENTAGONUS.

MUTINUS MINIMUS (Fig. 103).—Known from a figure reconstructed from a dried or alcoholic specimen. Color, red. Seems to differ from others in its rugulose receptacle. Described from Tonkin.

MUTINUS BORNEENSIS (Fig. 104).—Figured from Borneo, in an Italian journal. Was said to have a white stipe and short red spore-bearing portion. We reproduce a figure from Tonkin.[8]

MUTINUS PROXIMUS.—Based on a dried specimen in the British Museum, from Ceylon. It is a small species, described as having a white stipe, but the plant is accompanied by a sketch showing an orange stipe. It seems to be close to caninus. It has not been figured.

MUTINUS CURTUS (Fig. 105).—Only known from one collection made in Australia sixty years ago, which seems to be immature. The figure reconstructed by Corda is no doubt inaccurate, especially as to the lobed volva.

MUTINUS PAPUASIUS (Fig. 106).—Known only from a figure from a dried specimen, from Australia. It is not known whether it is a Mutinus or a Phallus.

MUTINUS ARGENTINUS (Fig. 107).—This was originally published without illustration and was referred by Professor Fischer, doubtfully, to Mutinus Muelleri. The latter seems from Fischer's illustration to be Mutinus bambusinus, and is so referred by Moeller. Spegazzini has recently published a figure of Mutinus argentinus which seems to me quite different from bambusinus. It has a short, thick spore-bearing portion. From the figure one could not say it was not Mutinus caninus of Europe, though it is rather stocky for that.

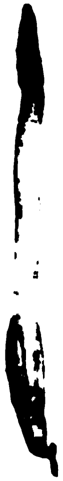

Fig. 30.

JANSIA RUGOSA.
(Natural size.)

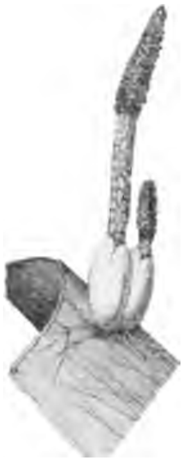

Fig. 32.

JANSIA ELEGANS.
(Natural size.)

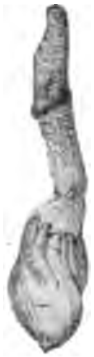

Fig. 35.

JANSIA BONINENSIS.

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[8] In our account, Myc. Notes, p. 388, we confused Mutinus borneensis of Borneo with Mutinus boninensis of Bonin Island. Both are imperfectly known, but the latter seems to be a Jansia, and both may in time prove to be the same plant. Since we have seen the types of Jansia boninensis we think we have inaccurately referred here (page 402) a species of Mutinus from Japan.

THE GENUS JANSIA.

This is a genus of very small phalloids, common in Java and well illustrated by Penzig. The general form is that of a little Mutinus, but the spore-bearing portion is strongly differentiated from the stipe, and it is strongly rugulose or papillate. Two species occur in Java and have been well illustrated. They grew on rotten wood. There are two imperfectly known species, one from Bonin Island and one from Australia.

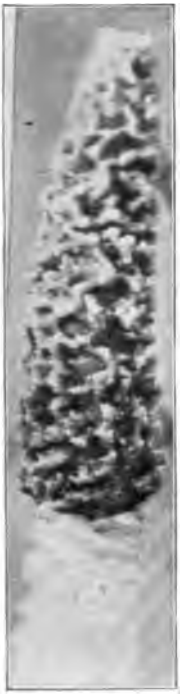

Fig. 31.

JANSIA RUGOSA.
(Enlarged.)

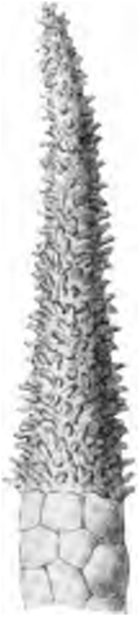

Fig. 33.

JANSIA ELEGANS.
(Enlarged.)

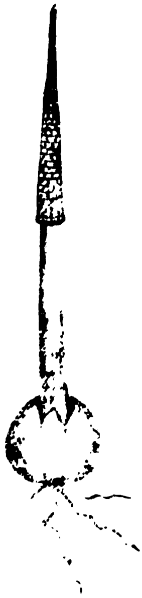

Fig. 34.

JANSIA ANNULATA.

JANSIA RUGOSA (Figs. 30 and 31).—This is a very small phalloid, which is common in Java. The short gleba-bearing portion is strongly distinct from the stipe and is strongly rugulose, as shown in our enlargement (Fig. 31). It is the only species of Jansia that is common and well known. This little plant is white and grows on rotten wood.

JANSIA ELEGANS (Figs. 32 and 33).—This species is also known only from Java and is rare, at least Dr. Bernard does not report it. It grows on rotten bamboo stems. It is of the same size and appearance as the preceding little species, but the gleba-bearing portion is strongly covered with little processes, instead of being rugulose.

JANSIA ANNULATA (Fig. 34).—This plant is known only from a figure published from Australia. No specimen exists. The stipe is white, the gleba-bearing portion "red-ochre" and "annulated." The plant is therefore probably a Jansia, but this is not surely known.

JANSIA BONINENSIS (Fig. 35).—This species from Bonin Island, is only known, I think, with certainty, from one collection in alcohol. The gleba bearing portion is slightly rugulose, and it seems intermediate between Mutinus and Jansia, being typically neither. The type collection is in alcohol in Berlin. I am not sure that Mutinus minimus and Mutinus borneensis are not both the same as this species.

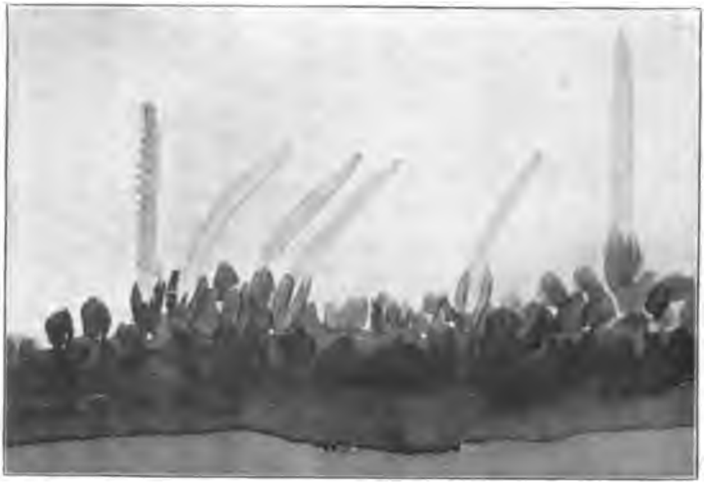

Fig. 36a.

FLOCCOMUTINUS ZENKERI.

(Showing habits of plant.)

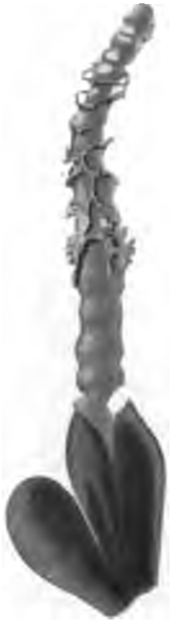

Fig. 36.

FLOCCOMUTINUS ZENKERI.

(Much enlarged.)

THE GENUS FLOCCOMUTINUS.

This genus is very curious and is intermediate between the pileate and non-pileate phalloids. The gleba covers a *loosely attached* network surrounding the stipe, and while *similar* to the veil of a Phallus, it is analogous to the *pilcus* of a Phallus. The drawing by Professor Fischer (our figure 36) gives a good idea of this structure. The exact attachment of this network I could not make out from the type owing to the minuteness of the parts, though that it is attached (loosely) in some manner is evident. It appears to me as a very distinct genus, essentially different in its basic structure from both the genera Jansia and Mutinus, with which it has been recently united.

FLOCCOMUTINUS ZENKERI (Figs. 36 and 36a).—But one collection of this curious genus is known, which is in alcohol in the museum at Berlin. It is accompanied by a colored sketch of the fresh plant, made by the collector, showing well its habits. We reproduce this drawing (Fig. 36a), though, owing to the difficulty of photographing colors, our figure does not do the drawing justice. In habits Floccomutinus Zenkeri is very similar to Jansia elegans of Java. The little plants are borne caespitose on a common, mycelial pad. The eggs are elongated in form and open at the apex. The volva is not accurately shown in Figure 36.

THE GENUS LYSURUS.

This genus has been very much misunderstood, though of a very simple structure. It consists of free arms borne on a hollow columnar stem. The gleba is borne on the arms. It has been shown that in the original species the gleba is borne on the outer side of the arms, hence species with gleba on the inner surface of the arms have been transferred to Anthurus, which genus does not have a columnar stem. I think it is much simpler to define Lysurus as originally defined, viz.: a columnar stem bearing free arms at the apex. With respect to the position of the gleba, there are evidently two series, and a new genus will probably be made for those with the gleba on the inner side of the arms. It has recently been shown by Mr. T. Petch, Ceylon, that the arms of Lysurus Gardneri[9] (which was the second species known) are not entirely free, but are united by a delicate membrane. We would therefore modify the definition of the genus to include species with arms free or very slightly united.

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[9] Ever since the species was published there has been a difference of opinion as to whether the arms were united or not, a difference of opinion that was legitimate from the fact that the type specimens at Kew do not bear out the original statement in this respect. Before seeing the specimens Fischer decided they were united, and changed the classification on that account. Massee, who had the type in charge, writes: "The segments are not organically united at the tip, but during the young stage are closely pressed together, and having been dried in that condition appear to be united. When the mucilage is moistened the tips are found to be quite free and are normally so in several out of the twenty-three specimens in the herbarium." Knowing the direct divergence of opinion on the subject, I went very carefully into the question on my previous visit to Kew. Some of the specimens appear to have never been united (see photograph, Figure 38a, from one of the types), and while in many specimens they are convergent and covered with the gleba, I did not believe there was any union between them, and so published. I included them in Lysurus, where I think the plant is best classed, though as they are united it becomes necessary to modify the definition of this genus. Mr. Petch, who has observed two specimens fresh, finds the tips of the arms united by a delicate membrane, a fact that could not be told from the dried specimens at Kew. He puts it in the genus Colus, although it has no resemblance or analogy to that genus. In order to justify his name he changed the definition of the genus Colus, and gives it a definition that excludes from the genus the original and only species known to belong to it. I believe a man has a right to modify a definition of a genus to include species which he thinks should be classed in the genus, but he has no right to draw up his definition so as to exclude the original species and change the original idea entirely.

LYSURUS MOKUSIN (Fig. 37).—This is the original species of Lysurus and was one of the first foreign phalloids known. It was figured in 1774 by Father Cibot, a missionary in China. The stem is strongly fluted and bears free arms, which are also fluted. It has been found in several stations in China and Japan, but is unknown from other parts of the world. We have a drawing from Professor Gono, Japan, that shows a white stem and red arms. We do not know, however, that these colors are constant.

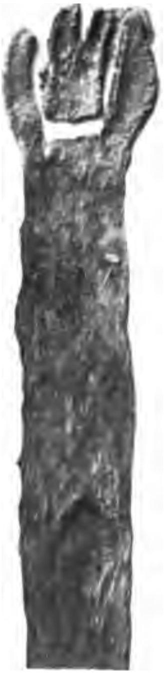

Fig. 38a

LYSURUS GARDNERI.
(Photo of a type.)

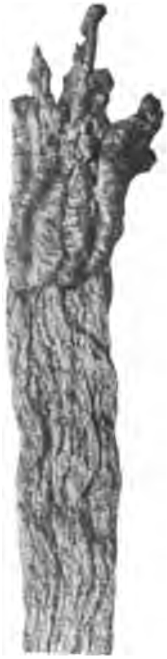

Fig. 39.

LYSURUS
AUSTRALIENSIS.
(From the type.)

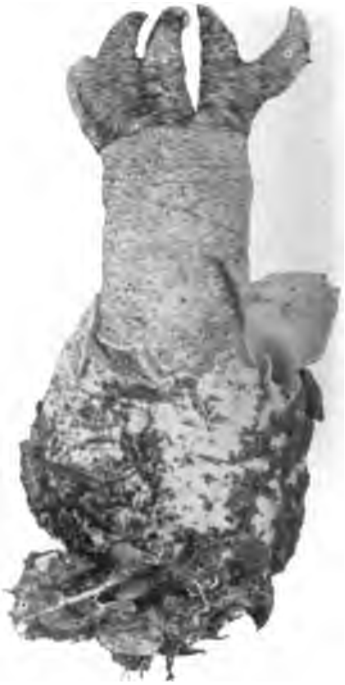

Fig. 40.

LYSURUS BOREALIS.
(Stocky form.)

LYSURUS GARDNERI (Figs. 38 and 38a).—This species has been known for many years only from the original collection from Ceylon, at Kew. It has been recently discovered in Ceylon by Mr. Petch, but is of rare occurrence and only recorded from the island. Mr. Petch's observations of the fresh plant show that the arms are united by a very distinct membrane, which would take it out of the genus Lysurus as formerly defined. As it was originally classed in this genus, however, and as its relations are evidently with the genus Lysurus, I think it better to modify the definition of the genus to in-

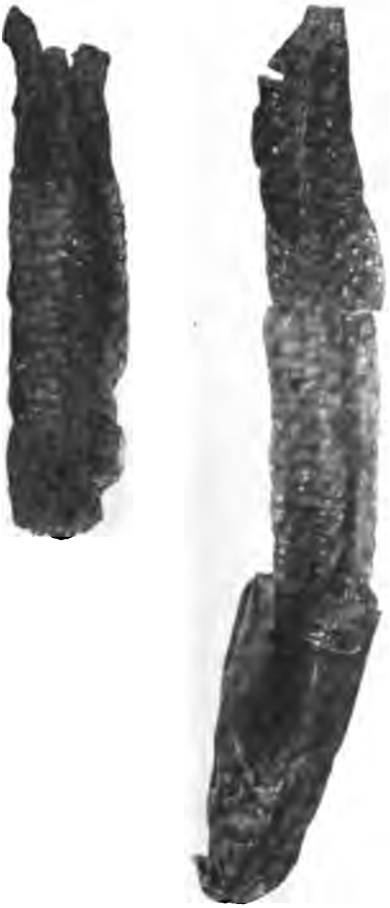

Fig. 37.

LYSURUS MOKUSIN.

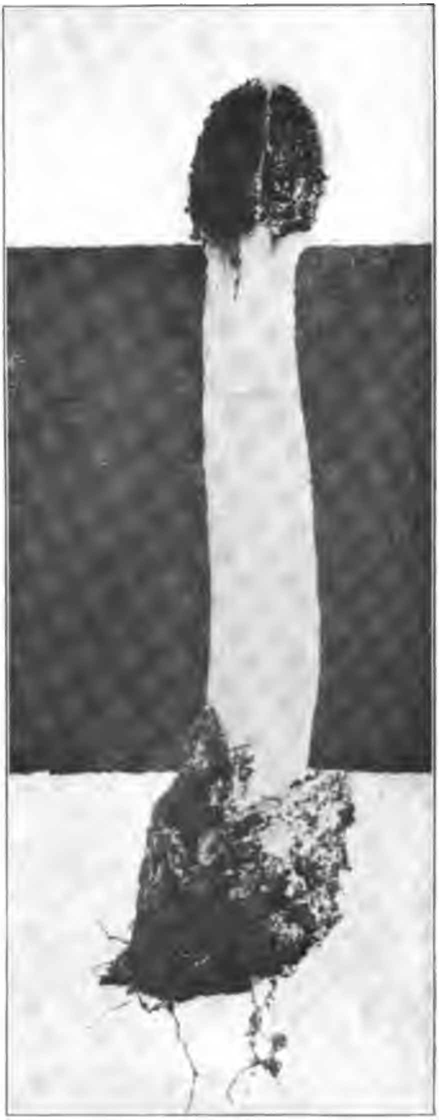

Fig. 38.

LYSURUS GARDNERI.

clude it.[10] The photograph of Lysurus Gardneri, as well as the dried specimens, has a close resemblance to the two following species, and I have heretofore believed that in time they would all three prove to be the same species. We must abandon this idea now that Professor Petch has demonstrated that the arms of Lysurus Gardneri are organically united, for they are entirely distinct in both of the following species.

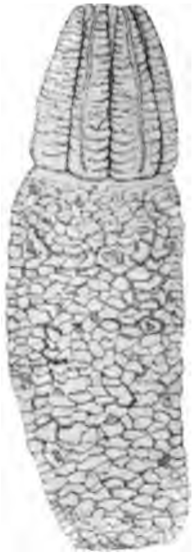

Fig. 42.

LYSURUS CLARAZIANUS.

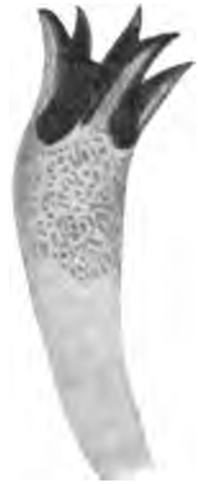

Fig. 43.

LYSURUS SANCTAE-CATHERINAE.

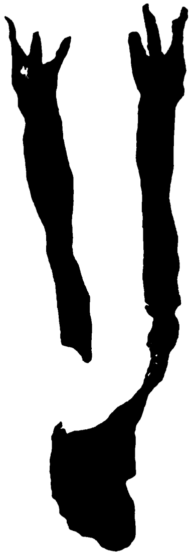

Fig. 45.

LYSURUS WOODII. (From the co-type.)

LYSURUS AUSTRALIENSIS (Fig. 39).—One collection of a Lysurus from Australia is at Kew, published as above. How it differs from Lysurus borealis I do not know. Professor McAlpine has advised me of a red Lysurus in Australia, but I have not had further details. As I think the published figure of Lysurus Australiensis is overdrawn and inaccurate, I present a photograph of the type, which, while not satisfactory, is true as far as it goes.

LYSURUS BOREALIS (Figs. 40 and 41).—This is claimed to be distinct from the preceding, but I know no points of difference.

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[10] It has been classed in the genus Colus, but for me it has no characters in common with the genus Colus, which is a *clathrate* genus. It might be included in Pseudocolus according to the definition of that genus, but it is so different from all species of that genus I think it better not to so include it.

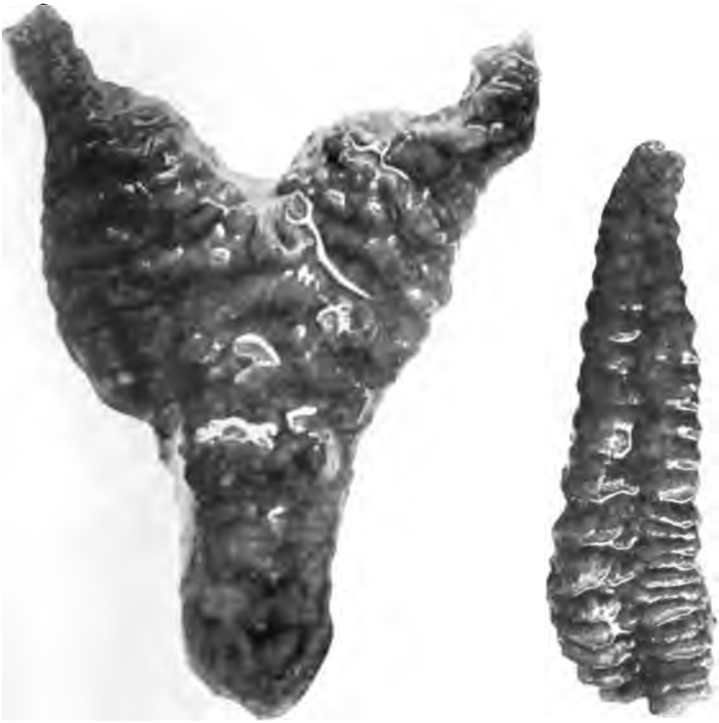

Fig. 45a.

LYSURUS (unnamed).
(The limb and an arm enlarged five times.)

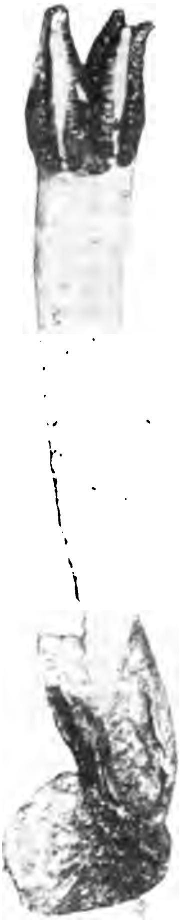

Fig. 41.

LYSURUS BOREALIS.
(Slender form.)

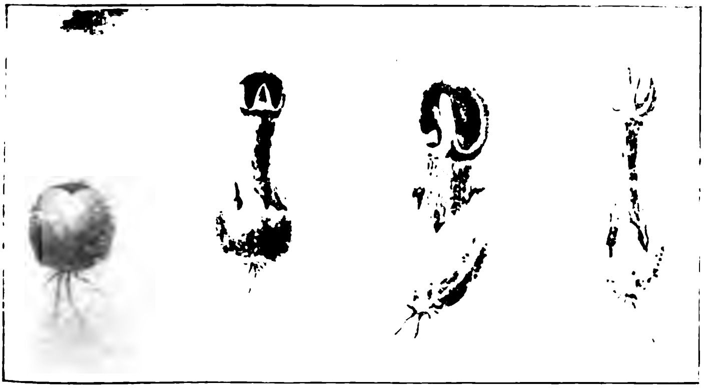

Fig. 44.

LYSURUS CRUCIATUS.

It has a curious history in the United States and Europe and is supposed to be an introduced plant. It grows in gardens, sod, and other cultivated places. It occurs mostly in our Eastern States. In Europe it has been found in three localities, all in recent years. First by Dr. Hennings in Germany, then by Mr. Carleton Rea in England, and then by Mr. Harold Murray, of Manchester, England. Mr. Murray's plant has a white stem and red arms. Professor Long also advised me of a red Lysurus in Texas. We present two photographs, one a stocky plant from England, the other a slender specimen from the United States. We are told, however, that these same "stocky" forms occur in the United States.

LYSURUS CLARAZIANUS (Fig. 42).—This was a small plant, described from Argentina. It is red and small, but otherwise seems about the same as the preceding.

LYSURUS SANCTAE-CATHERINAE (Fig. 43).—This was based on a picture from Brazil. It seems to have the gleba in a globose mass on the center of the apex of the stipe rather than surrounding the arms. The color is red. It may be an Anthurus.

LYSURUS CRUCIATUS (Fig. 44.)—A very small species with four arms, the gleba forming a ball on the top of the stem. It is only known from the original collection, which was from French Guiana, and is preserved at Paris. We present the original drawing in our illustration.

LYSURUS WOODII (Fig. 45).—This is a small, red species, imperfectly known from South Africa. Our photograph is made from the cotype at Kew. The arms are three or four and are "magnificent scarlet," the stem "waxy yellow." The specimens are from Mr. Wood and are the same as those named and figured by Kalchbrenner as Anthurus Woodii. While it is unsafe to draw conclusions from dried specimens, we believe the species is a Lysurus entirely distinct from the genus Anthurus and that Kalchbrenner misconceived and misdrew the illustration. We, therefore, present a photograph of the dried specimen, which though a very poor illustration is better than an inaccurate drawing.

UNNAMED SPECIES (Fig. 45a).—We have received from F. M. Reader what is surely an unnamed species from Australia. It is a very small species, as will be seen by reference to our photograph, which is an enlargement four diameters. The limb is four-angled, enlarged above, and bears an arm at each angle. The color is red. The specimen sent us (in formalin) had evidently been cut in two pieces and these arms all broken off, so that we could not make much of a picture of it. We think it will be recognized, if found again by our Australian friends, and we do not name it. We hope some one in Australia will give a good photograph of it from the fresh plant and give it a name. We should be glad to have a perfect specimen in alcohol.

THE GENUS ANTHURUS.

Though largely confused with Lysurus, the genus Anthurus as originally proposed is very distinct. The stem is a *flaring tube*, the limb divided into segments, and it bears the gleba on the inner side of these segments. But one species is satisfactorily known, and that one is due to the work of Prof. D. McAlpine of Australia.

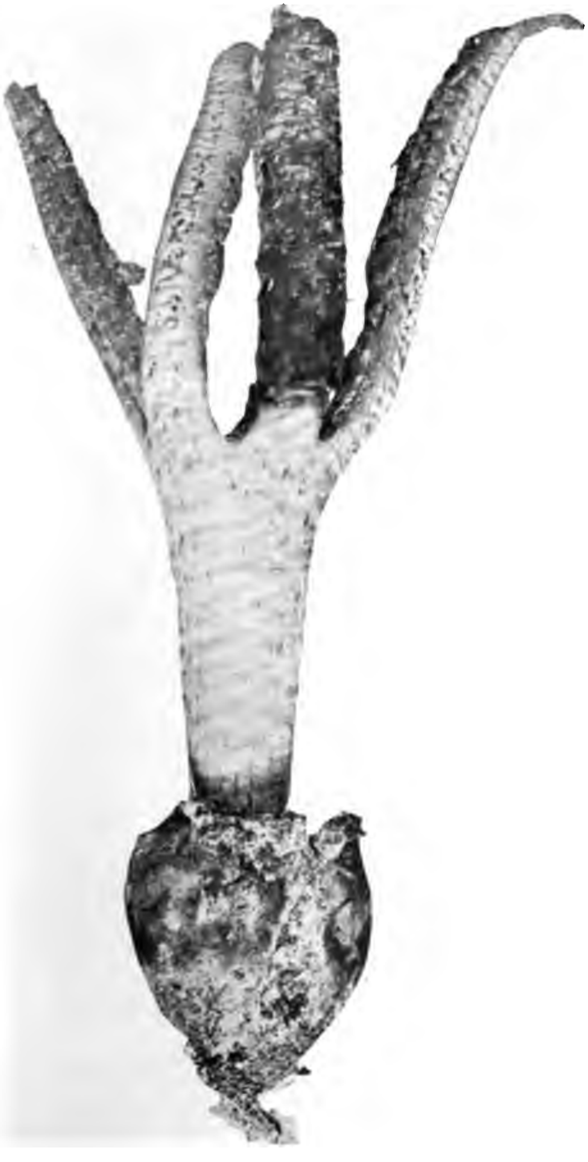

Fig. 46.

ANTHURUS ASEROEFORMIS.

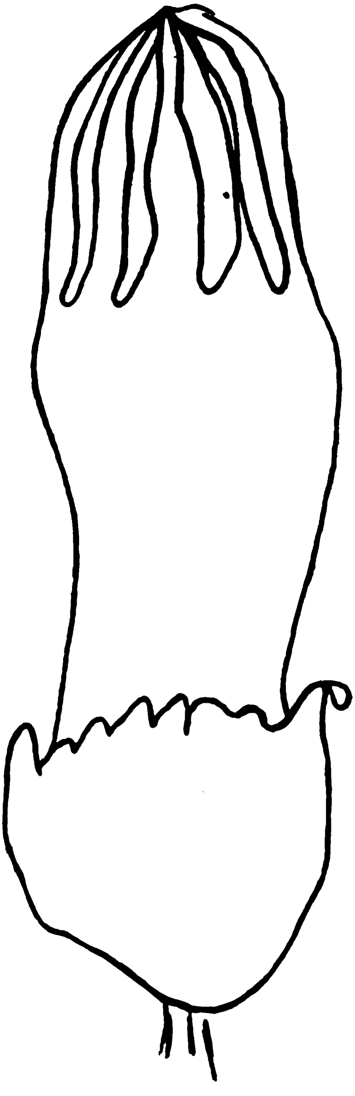

Fig. 49.

ANTHURUS CALATHISCUS.
(The original drawing.)

ANTHURUS ASEROEFORMIS (Fig. 46).—Professor McAlpine describes the plant as follows:

"Receptacle with hollow stem, expanding above into five arms, directed upwards and outwards. Stem salmon pink, slightly darker at top, fully three inches long, rugose with small depressions running more or less in lines and slight ridges running crosswise, so that it looks as if divided into a series of squares, about ½ inch in diameter towards the tapering base and ⅞ inch at top. Arms three inches long, merging into stem and tapering to a point, blood-red on inner face, convex and broken up into larger or smaller cavities, on outer face there is a continuation of the color of the upper portion of the stem and gradual darkening until toward the tip it is blood-red like inner face with thickened, slightly raised margins and central furrow broken up into small cavities.

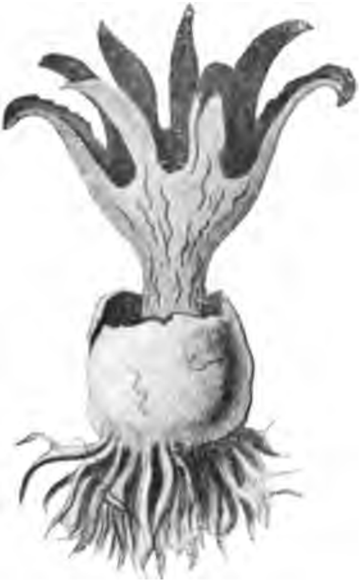

Fig. 47.

ANTHURUS MUELLERIANUS.

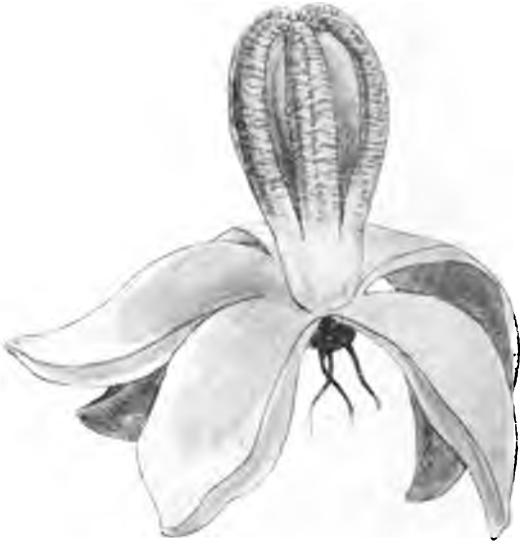

Fig. 48.

ANTHURUS ARCHERI.

"Gleba blackish with tinge of bronze green, extending along the inner surface of each arm, but not covering the slender tip.

"Volva somewhat cup-shaped, about as long as broad (1½ inches) dirty-white, splitting at the apex, tapering towards the base and provided there with turfs of elongated fibrous roots.

"Spores hyaline, cylindrical to elongated ellipsoid, rounded at both ends, sometimes vacuolated but generally homogeneous contents, 6-8 x 2½-3 mic., occasionally 9 mic. long.

"A solitary specimen growing in a garden among violets, near Melbourne, Victoria, April, 1907. Forwarded by C. French, Jr. It had a very disagreeable smell. Owing to its fragile nature, one of the arms fell away and only the arm to the right in the photograph shows the slender tip."

This description, taken in connection with the photograph that Professor McAlpine sends, gives a perfect idea of the plant, and it is the only Anthurus that is really known.

ANTHURUS MUELLERIANUS (Fig. 47).—This, the original species of the genus, is known only from a drawing supposed to be quite inaccurate. It was from Australia, and the color was described as yellowish-red and shown bright red. I rather suspect that it was based on the same plant as the preceding.

ANTHURUS ARCHERI (Fig. 48).—This is known only from a figure, and that is doubtful. It was from Tasmania. It seems from the figure to be an Anthurus, but in the sectional drawing the arms are shown to be bifid, and it seems to incline toward the genus Aseroe.

ANTHURUS CALATHISCUS (Fig. 49).—The original of this species, as far as I can learn, is a crude figure found in the herbarium of Montagne from Perrottet, India. I think it was published as Calathiscus Sepia, and if so, then a most fantastic and imaginary figure was given of it. Perrottet gives the color as "jaune pale." No similar plant has since been sent from India, but his figure evidently is an Anthurus.[11]

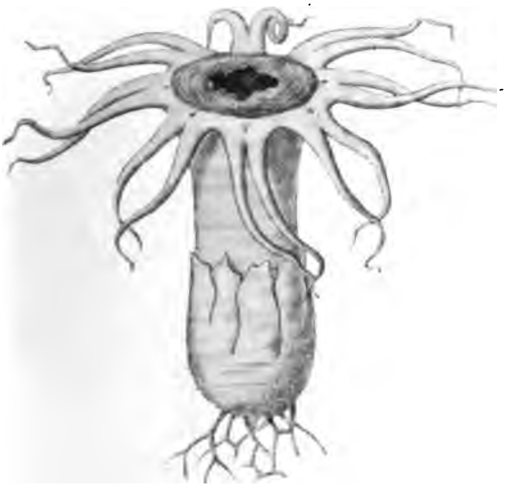

Fig. 51.

ASEROE PENTACTINA.

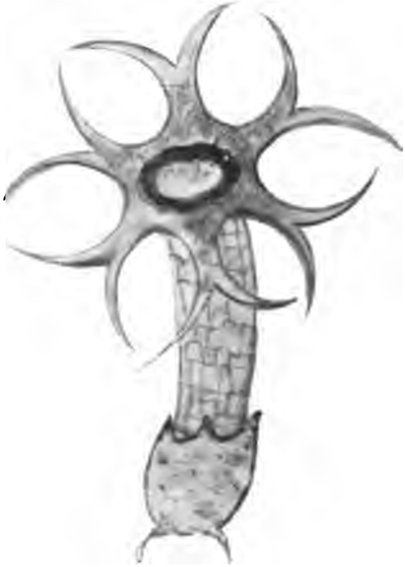

Fig. 53a.

ASEROE PALLIDA.

THE GENUS ASEROE.

Stem tubular, abruptly spreading into a horizontal limb, which is divided into a number of long, slender, usually bifid segments.

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[11] Although I have hunted diligently for the original of the fantastic picture that for sixty years has embellished our phalloid literature, I have found no other evidence than the cut reproduced Fig. 49. It has so little resemblance to the published figure that it does not seem possible to have been the source. It was from "Perrottet, India," and on a sheet with two other sketches taken by Perrottet to be different species, but which appear to me to be forms of the same. Montagne has endorsed this sheet "Perrottet Calathiscus et Aseroe pentactina Endl.," and it therefore seems to be the source of his "Calathiscus."

These are generally prolonged into long, slender points. The color of most species is bright red, and they are among the most showy phalloids. The genus is at home in Australia, where many forms occur. It also grows in Java and the East. No species is known from America or Europe, and it is vaguely known from Africa.[12] The species all are very similar and have been reduced to two by Professor Fischer. However, the figures that are supposed to represent them seem so different that we would prefer to consider them distinct, at least until more is known about them. We believe, however, that there are three distinct species under which the forms should be arranged: Aseroe rubra, which includes the Australian forms and has a *narrow* limb; Aseroe Zeylandica, to which all the East Indian forms should be referred, and which has a *broad* limb; Aseroe arachnoidea, which is quite distinct from both the others.

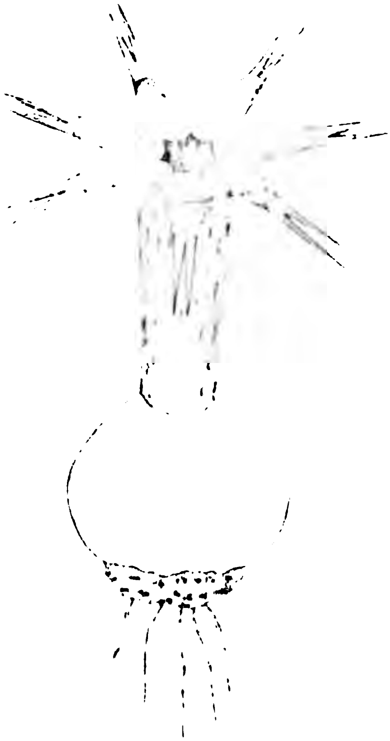

Fig. 50.

ASEROE RUBRA.

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[12] At Berlin there is a very imperfect dried specimen of Aseroe from Africa!! It is so poor that I would not wish to even venture on its form, but the occurrence of the genus in Africa is not recorded, I think, and is of interest.

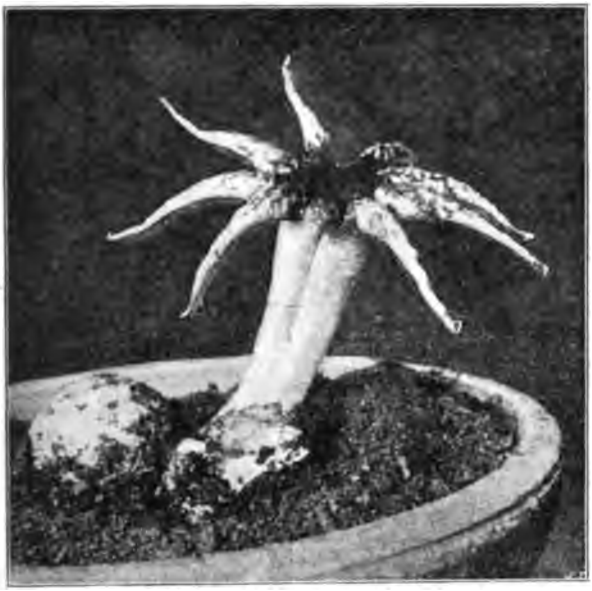

Fig. 55.

ASEROE ARACHNOIDEA.

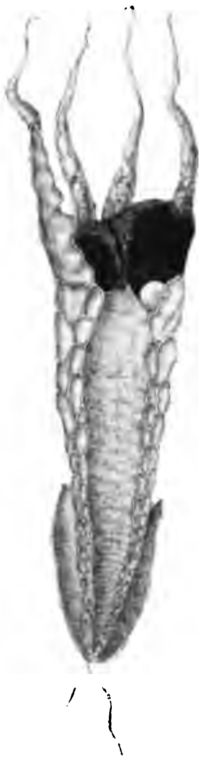

Fig. 56.

ASEROE ARACH-
NOIDEA. (Section.)

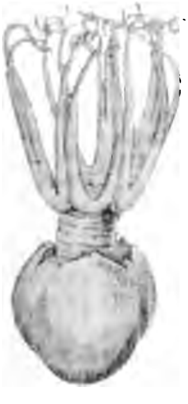

Fig. 52.

ASEROE HOOKERI.

ASEROE RUBRA (Fig. 50).—This was the original form known, and was from Australia. It has short, spreading rays. This exact form does not appear to have reached Europe since, but adventitious plants which are exactly the same have appeared in the hothouses at Kew.

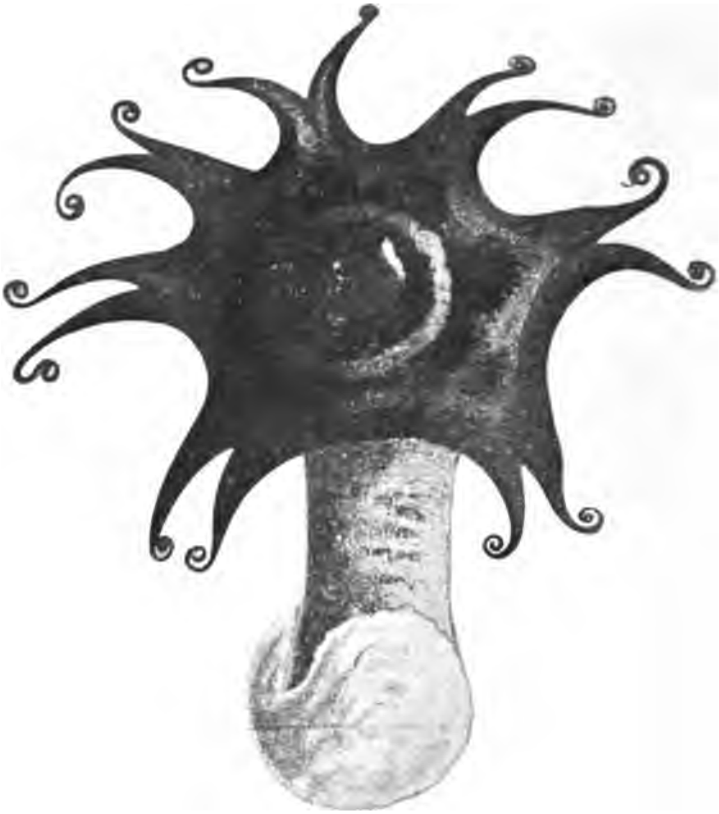

Fig. 53.

ASEROE MUELLERIANA.

ASEROE PENTACTINA (Fig. 51).—From the specimens that reach Europe this form seems to be the most common form in Australia. It has a narrow limb and long, slender rays. The name, pentactina, referred to the number (five) of the rays of the original specimen, but the number varies and is of no importance.

ASEROE HOOKERI (Fig. 52).—This was a very small form with a short stem and narrow rays that came from New Zealand. It is the smallest form described and appears to me quite different from the others.

ASEROE MUELLERIANA (Fig. 53).—This form from Australia has a broad limb and a general resemblance to Aseroe Zeylandica of Ceylon. However, the rays are shorter and differently disposed. I think it is known only from the picture. It seems quite different in its broad limb from the other Australian forms, if any reliance can be placed on the picture.

ASEROE PALLIDA (Fig. 53a).—At Berlin I found a dried specimen of an Aseroe from New Caledonia sent by Monsieur Le Rat, with a drawing (Fig. 53a) that seems to be well made. It differs from the Australian form not only in its narrow segments but pale coloration. The stem is "pure white," the limb "pale rose." I think it is worthy of record as a marked form of this variable species.

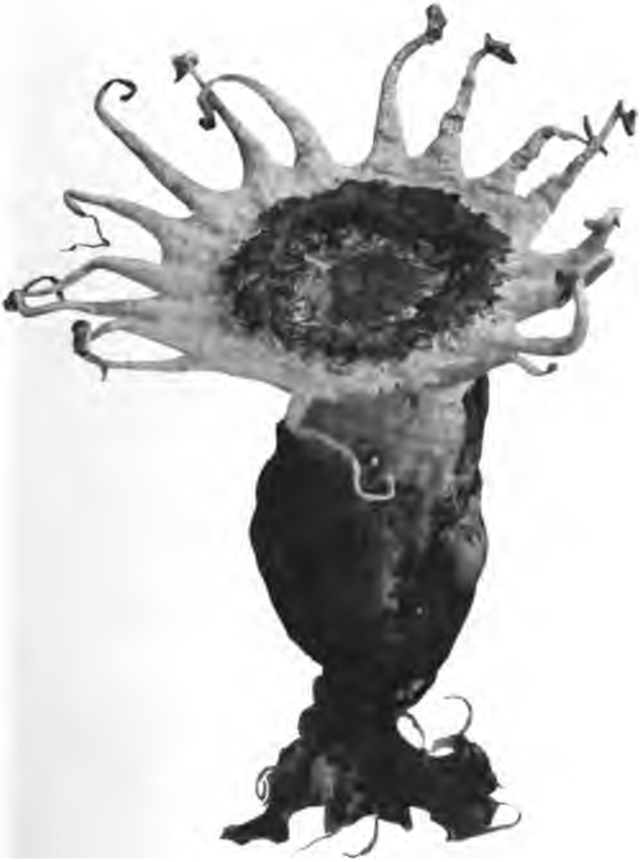

Fig. 54.

ASEROE ZEYLANDICA.

ASEROE ZEYLANDICA (Fig. 54).—This species is originally from Ceylon and is the largest and most showy of the genus. The broad limb is divided into a number of segments, and the whole plant is bright red. It was collected many years ago in Java (and called

Aseroe Junghuhnii), but is very rare there and was not found by Penzig. It has recently been found again by Dr. Bernard, who has kindly sent us the fine photograph which we publish.

ASEROE LYSUROIDES.—This was figured by Corda from specimens from Australia. It has a long, slender stem and short, broad rays. Corda's figures appear to me to represent two different genera, hence I do not reproduce it as I think there is surely something wrong about it.

ASEROE ARACHNOIDEA (Figs. 55 and 56).—This species differs widely from all that precede. It has simple rays, not bifid, as all others. The color is white: all others are red. It was based on alcoholic material at Paris collected "sur fumier" in Cochin China, by Dr. Harmand. It has since been found abundantly in Java by Penzig and Dr. Bernard, though not on manure. The stem is hollow, and pervious at the top, and the arms crown the limb of the stem.

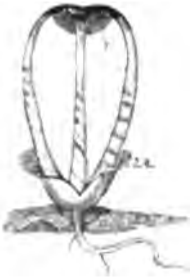

Fig. 59.

LATERNEA TRISCAPA.

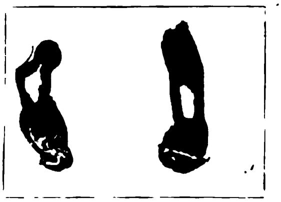

Fig. 60.

LATERNEA PUSILLA.

(From the type.)

THE GENUS LATERNEA.

This genus consists of columns (usually two to five) that are united at the top and bear the gleba clinging to the under side. It is chiefly an American genus, being very common in South America and Southern United States. There is one record from Africa and one species known from Japan.

LATERNEA COLUMNATA (Fig. 57 and 58).—Columns from three to five, usually four. When perfectly developed there is a groove on the outer surface. Color red, or perhaps also white. White plants have been figured from Chile and Africa that are probably the same thing. This is the original species of Laternea, and is the most common one. It is abundant in Southern United States and South America, and is also known from the West Indies and Hawaii.

LATERNEA TRISCAPA (Fig. 59).—This was the second species named, and is known only from the original figure. It is very much the same as Laternea columnata except its small size, and it may be only a small form.

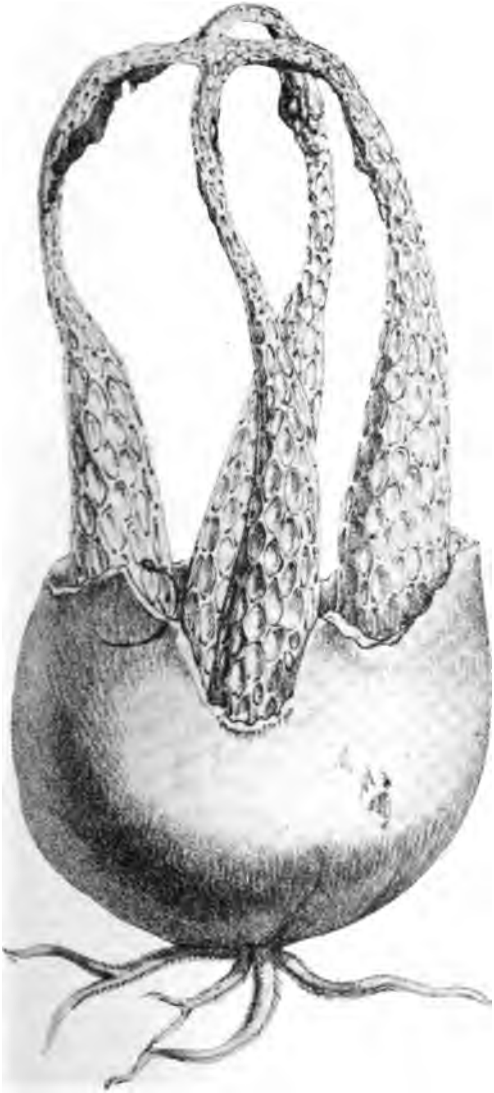

Fig. 62.

LATERNEA ANGOLENSIS.

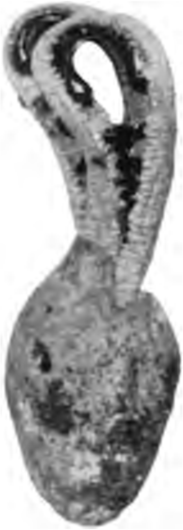

Fig. 61.

LATERNEA RHACODES.

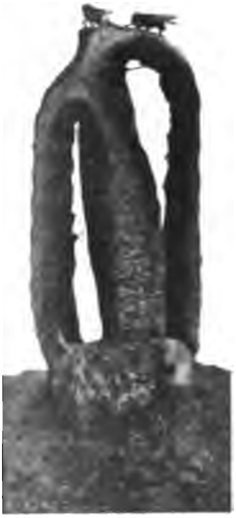

Fig. 58.

LATERNEA COLUMNATA.

It came from the West Indies. The figure shows only three columns, and for a long time that was considered its specific character. It is well known, however, that the number of columns varies in other species and undoubtedly also in this.

LATERNEA PUSILLA (Fig. 60).—This is known from a single specimen from Cuba, preserved at Kew. The character of this specimen is the two columns and its exceedingly small size. As Laternea pusilla has never been found since and was never figured, we have used for our illustration a photograph of the type specimen. When these small Laterneas are known from more ample collections, it will probably not be possible to draw any line between pusilla and triscapa and perhaps also columnata.

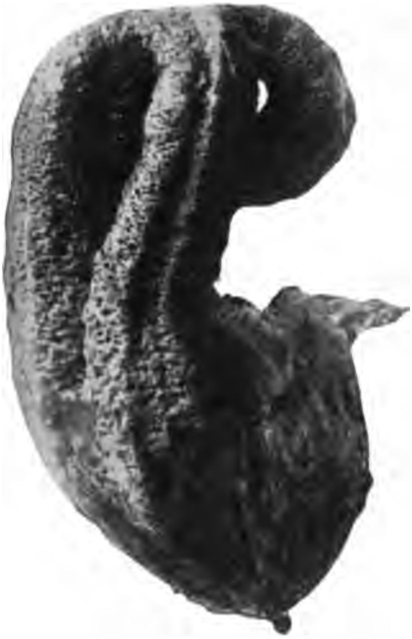

Fig. 57.

LATERNEA COLUMNATA.

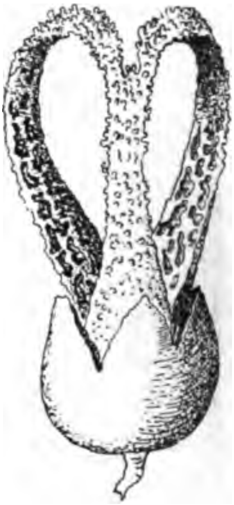

Fig. 63.

LATERNEA SPEGAZZINI.

LATERNEA RHACODES (Fig. 61).—In this species the inner cells of the columns are torn and lacerated, and on that account has been made into a new genus (Blumenavia). As the same character is afforded by more than one Clathrus, which are not separated on this account, we feel it better to include this in Laternea, with which it otherwise agrees. Laternea rhacodes was originally from Brazil, where it is reported to be common. It is not otherwise known.

LATERNEA ANGOLENSIS (Fig. 62).—This, from the picture, which is all that is known about it, is very similar to columnata except that the columns are more slender and reduced at the top, and the color is white. It is probably only a white form of Laternea columnata. It is the only record of the genus

Laternea in Africa and was from Angola. The recently described Blumenavia usambarensis from Africa is probably the same. The type is in alcohol at Berlin.

LATERNEA SPEGAZZINI (Fig. 63).—This, which we know only from a figure, differs from Laternea columnata in having the surface covered with papillate projections. It might well be made the type of a new genus. As far as known, it occurs only in Argentina, South America. The illustration shows only three columns, but the number probably varies.

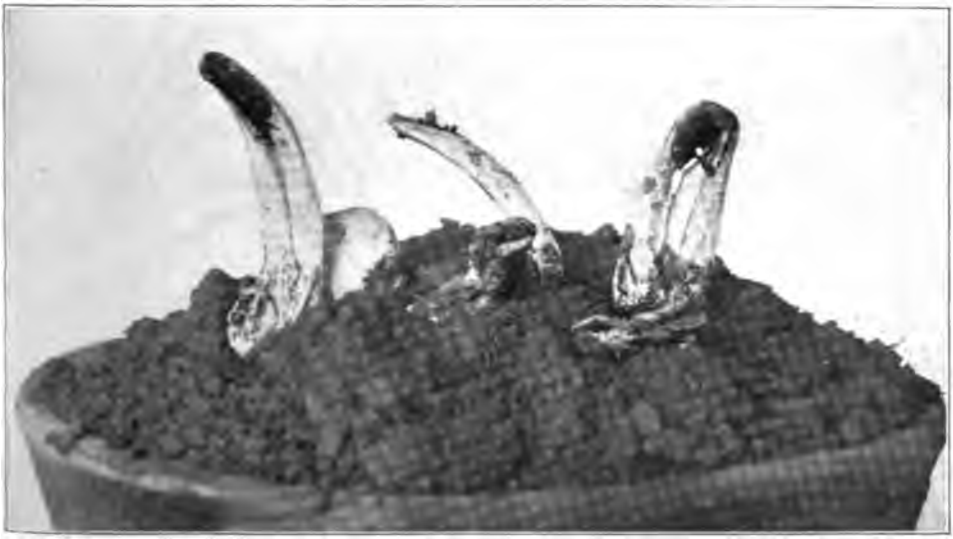

Fig. 64.

LATERNEA BICOLUMNATA.

LATERNEA BICOLUMNATA (Fig. 64).—Receptacle consists of two columns united at the top and free at the bottom. Columns slightly compressed, cylindrical, tapering above. Gleba attached to the under side of the columns near the apex. Color pale reddish. This species is known only from Japan and is the only Laternea recorded from that part of the world. We are under obligations to Professor Kusano for the photograph that we reproduce.

THE GENUS PSEUDOCOLUS.

The genus Pseudocolus consists of columns (three, as far as known) which are united at the top and at the bottom are consolidated into a stalk. In other words, it is a stipitate Laternea. The best known species are from Java and Brazil. Other and less perfectly known species occur in Australia, Reunion Island (Africa), Java, and Ceylon. All species of Pseudocolus appear to be very rare, and most of them are only known from a single record.

PSEUDOCOLUS GARCIAE (Fig. 65).—Receptacle consists of three tapering columns, slightly united at the top and bearing the gleba on the under side. Color, white. This is a rare species, known only from Brazil (Moeller) and rare there, for Father Rick has never found it.

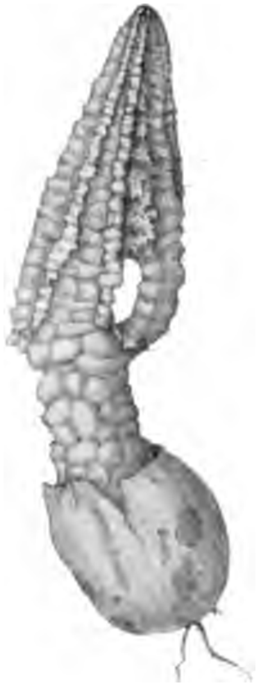

Fig. 66.

PSEUDOCOLUS JAVANICUS.

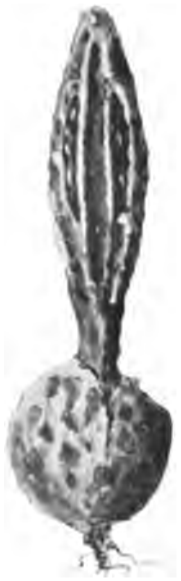

Fig. 68.

PSEUDOCOLUS FUSIFORMIS.

PSEUDOCOLUS JAVANICUS (Fig. 66).—From the illustration this seems to be very similar to the preceding species from Brazil. However, this is of a pale red color and grows in Java. It is a very rare plant and is only known from one specimen collected by Penzig. We reproduce Penzig's drawing, which is enlarged twofold from the plant.

PSEUDOCOLUS RUGULOSUS (Fig. 67).—Columns three, slender, united at the apex and into a short stipe at the base. The inner side of the columns are strongly rugulose, fluted. The stipe very short and included in the volva. *Color, red.* All that is known of this species is a figure preserved at Kew and made by Kurz in Java. It was referred to Laternea triscapa. If it exists at all it must be quite rare, for neither Penzig nor Dr. Bernard has found it.

PSEUDOCOLUS FUSIFORMIS (Fig. 68).—This species is based on a figure in the Museum at Paris, made on the Island of Reunion (near Madagascar). The plant is red; otherwise, our photograph of this figure (Fig. 68) is all that is known about it. If the plant was correctly drawn, as it seems to be, it appears to me to be very distinct from all the other species. Professor Fischer based the name fusiformis on this figure, afterwards withdrew it, referring the plant to Pseudocolus Javanicus of Java. That does not seem possible to me.

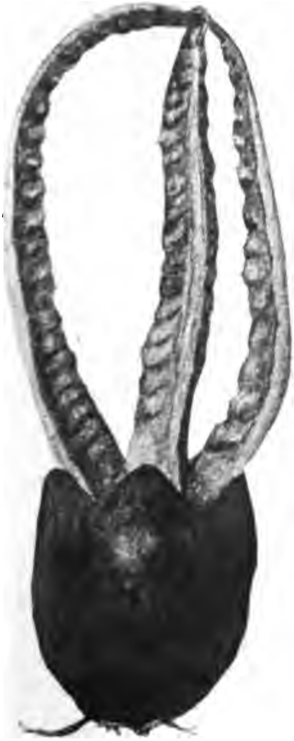

Fig. 67.

PSEUDOCOLUS RUGULOSUS.
(From the original sketch.)

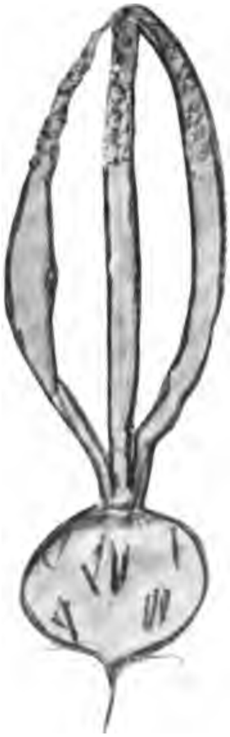

Fig. 69.

PSEUDOCOLUS ROTHAE.
(From the original sketch.)

PSEUDOCOLUS ROTHAE (Fig. 69).—Columns three, slender, united above and below into a short stipe which does not extend beyond the volva. Color, rich orange. This species is represented at Kew by two collections from Australia. It seems very similar to the preceding from Java, but is evidently a much more slender species. As no other illustration of it is known, we give a copy of a crude sketch by Bailey, sent with the plant.

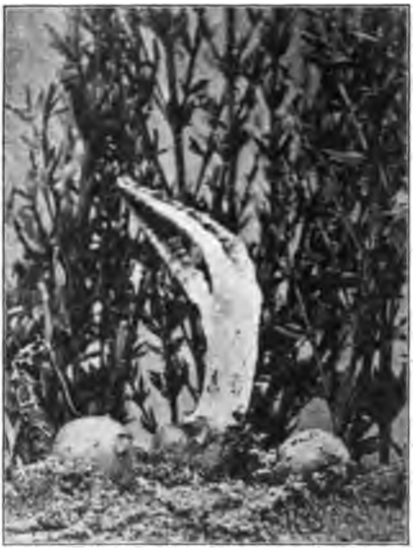

Fig. 65.

PSEUDOCOLUS GARCIAE.

THE GENUS CLATHRUS.

This genus has a receptacle consisting of a simple "sessile" network, bearing the gleba on the inner side. When young, the gleba forms a mass, filling the center of the egg; but as the plant expands, the gleba deliquesces and remains attached to the inner surface of the receptacle. The genus Clathrus as comprised in this pamphlet consists of two very distinct genera. Clathrus (true), with the receptacle composed of large cells, and Ileodictyon, with the receptacle formed of tubes. Clathrus cancellatus belongs to the former; Clathrus cibarius and gracilis to the latter. Where the other species belong we do not surely know, and hence do not attempt to maintain them as two genera.

CLATHRUS CANCELLATUS (Fig. 70).—Color, bright red. Meshes of the network subequal. Receptacle subglobose, composed of large cells, becoming torn and lacerate on the inner surface, the outer surface smooth, even. This well-known species is a native of Southern Europe. It is not rare in Italy and Southern France. It is a plant of warm regions and does not occur in Northern Europe except where the climate is modified by the Gulf Stream. It is found rarely on the channel coast, both of France and England, and even extends up into Holland. It occurs in Northern Africa, and has

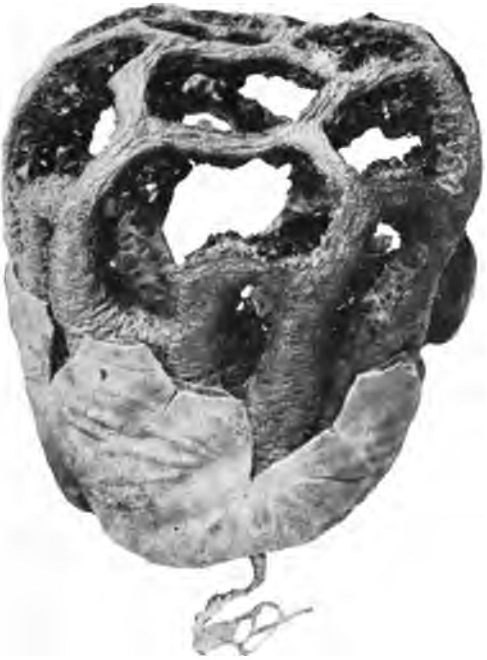

Fig. 70.

CLATHRUS CANCELLATUS.

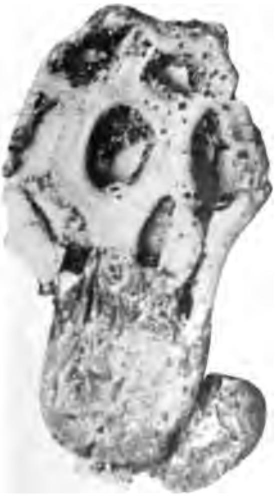

Fig. 71.

CLATHRUS AMERICANUS.

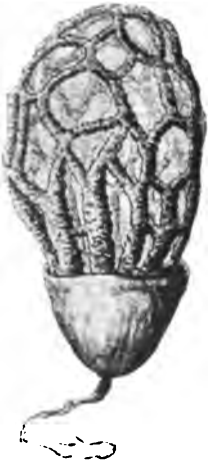

Fig. 72.

CLATHRUS CAMERUNENSIS.

been collected at a few stations in Florida and Georgia in the United States. In our country it is rare, and only known with certainty from the South.

CLATHRUS AMERICANUS (Fig. 71).—Color, red. Receptacle, elongated. Meshes subequal above, elongated below. Outer surface slightly grooved, smooth. This is a species of Brazil and the West Indies. It reached me first from Father Schupp, of Brazil, who sent a photograph (Fig. 71) and a dried specimen. Then from L. J. K. Brace, from the Bahamas, sent in liquid. In general form it appears to be very much like Clathrus pusillus, of Australia, but according to the original figure, that has much more slender branches. At Berlin I found a specimen (unnamed) from Paraguay.

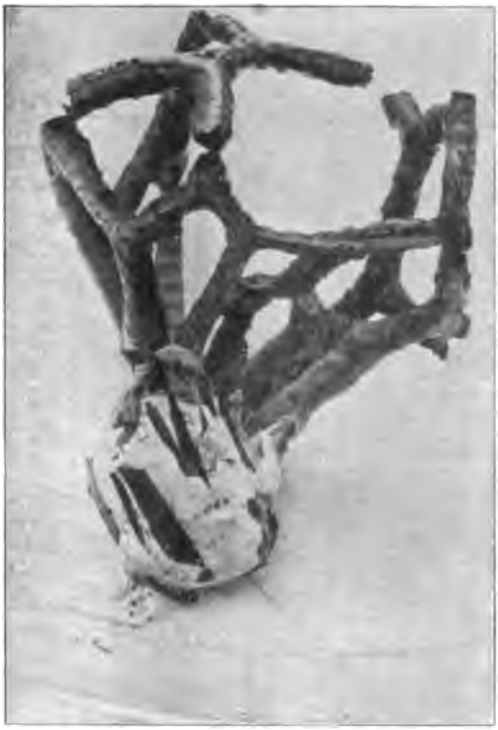

Fig. 72.

CLATHRUS TREUBII.

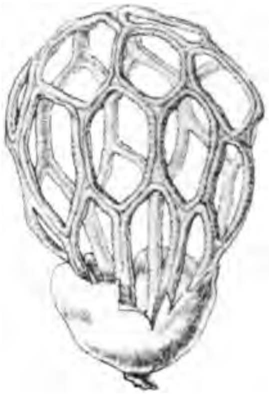

Fig. 73.

CLATHRUS PUSILLUS.

CLATHRUS TREUBEI (Fig. 72).—Color, bright red. Receptacle of large meshes above, below columned. The branches of the receptacle are *tubular,* smooth externally and corrugated on the inner surface. They are reduced in diameter above, and when old they break apart, and the primary columns separate. Clathrus Treubei was recently described by Dr. Bernard, from Java. At Upsala there are alcoholic specimens collected in Java by E. Nyman, and an old specimen of the same collection was discovered at Berlin to be a new species of Laternea (pentactina).

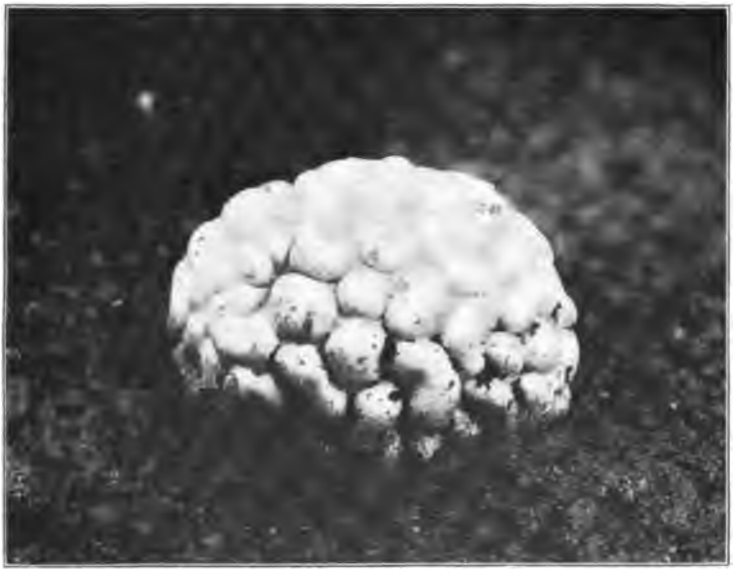

Fig. 74a.

CLATHRUS CRISPATUS.

(Egg.)

CLATHRUS PUSILLUS (Fig. 73).—Color, bright ruby red. Meshes subequal above, elongated below. Branches of the receptacle wrinkled. This species is only known from the original collection made on the Swan River, Australia, more than sixty years ago. What is apparently a very good figure of it (Fig. 73) was given by Berkeley, though it seems to me the branches of the receptacle are more slender than is borne out by the specimens at Kew.

CLATHRUS CAMERUNENSIS (Fig. 74).—This species was described from Camerun, Africa, and figured. The figure appears to be very much the same as Clathrus pusillus from Australia, but the African plant is said to be dark olive and the Australian red. The type is in alcohol at Berlin. It seems to be an Ileodictyon with tubular arms. The most marked feature of it to me is the reduced diameter of the upper bars.

CLATHRUS CRISPATUS (Fig. 74a).—This species is only known from the elevated regions of Ceylon and is imperfectly known from there. It was originally sent to Europe (dried specimens) many years ago, and referred to Clathrus cancellatus, to which it seems to have little resemblance. The net is composed of broad, flattened bars which form small meshes. The color is red. No photograph or drawing is known (in Europe) but it must be quite different in appearance from Clathrus cancellatus. We reproduce a photograph of an unopened egg. This has a tubercular surface, corresponding to the form of the enclosed net, and is a character not seen at all in the European species. At the British Museum there is a species from *Yucatan* (!) that seems to be this species. Mr. Petch, who has rarely seen it, writes me that the bars are flattened-triangular in section, the broad, flat surface exterior.

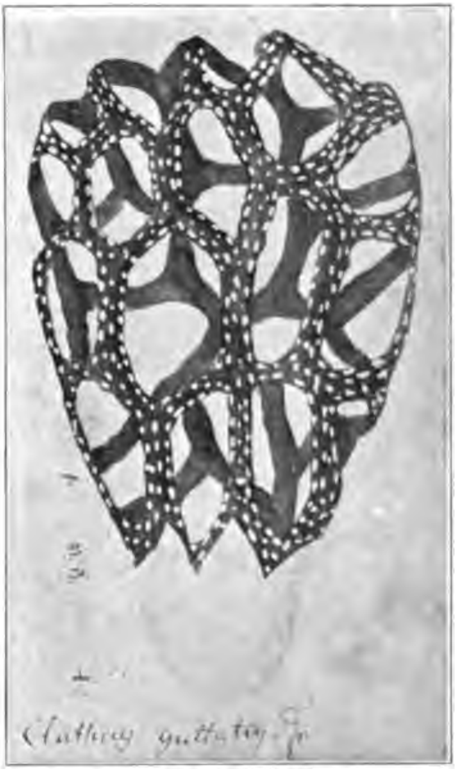

Fig. 75.

CLATHRUS GUTTULATUS.

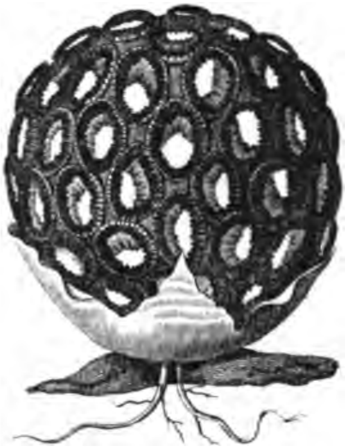

Fig. 76.

CLATHRUS CRISPUS.

CLATHRUS GUTTULATUS (Fig. 75).—Color, bright red. Branches of the net narrow, thin, smooth. They appear to be tubes. Color, bright red. Nothing is known of this species excepting the original figure in the collection of Fries. It was made by Oersted, from St. Thomas. The guttae appear to me to be spots of white lead on the drawing, intended to show the porous nature of the receptacle.

CLATHRUS CRISPUS (Fig. 76).—Color, salmon. Receptacle, subglobose, with subequal meshes. Branches of the receptacle broad, strongly wrinkled. This seems to be a frequent species in the West Indies and is recorded also from Mexico and South America. Plumier, two hundred years ago gave a crude but evident figure of it. Next it seems to have been very characteristically figured by Turpin (Fig. 76). It was sent to Berkeley from Uruguay. It has been recorded several times, mostly from the West Indies. No photograph is known, but the original drawing seems characteristic.

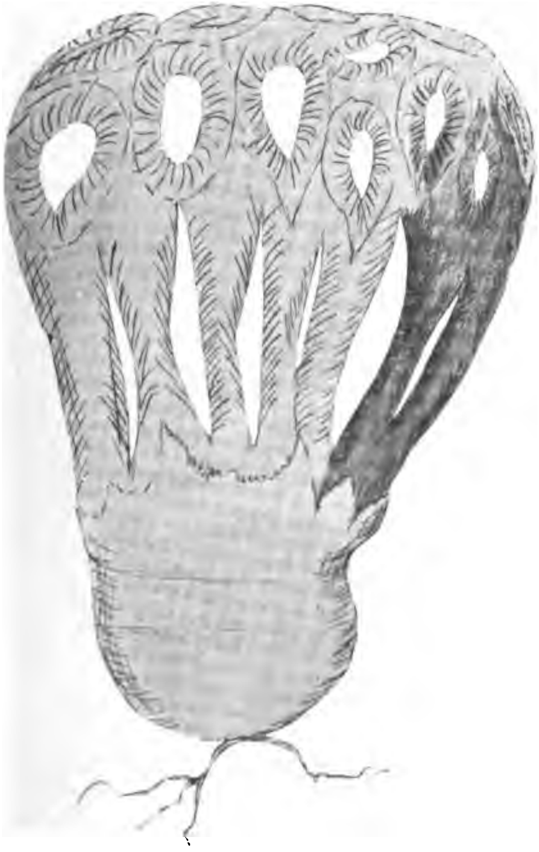

Fig. 77.

CLATHRUS PSEUDOCRISPUS (reduced one-third).

CLATHRUS PSEUDOCRISPUS (Fig. 77).—A figure (Fig. 77) of what is probably only a form of Clathrus crispus is found at Kew from Dr. McCatty, Montego Bay, Jamaica. It differs from crispus, as is shown by the figure, in having the meshes below elongated. Whether it is a distinct species, a distinct form, or whether crispus really has this character we do not know. The color as shown is dark red.

CLATHRUS PSEUDOCANCELLATUS.—This plant was named from Central Africa. It was orange-red and described as having broad, flattened branches. No figure has been given of it from which any idea whatever can be gained of the general appearance of the plant, nor could I form a much more definite idea from the types in alcohol at Berlin. They were probably originally in formalin as they have lost all definite form.

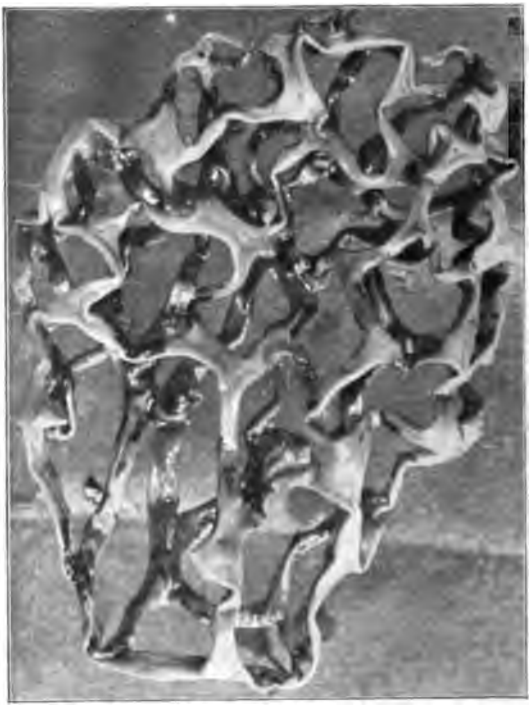

Fig. 79.

CLATHRUS GRACILIS.

CLATHRUS CIBARIUS (Fig. 78).—Color, white. Receptacle with smooth, tubular branches and large, pentagonal meshes. Our figure (78) will give an idea of the general appearance of this plant, but not of the size, for the photograph is evidently much reduced. The plant is four or five inches in diameter. It is a very common species in New Zealand, and it occurs rarely in Australia. It also grows in Chile, and a curious form has been collected in Brazil. It is said that the natives of New Zealand formerly employed the plant for food, hence the name.

CLATHRUS AFFINIS.—At the British Museum there is a specimen collected by G. A. Ramage, Pernambuco, Brazil, which is certainly a distinct form if not specifically distinct. It has the general appearance of Clathrus

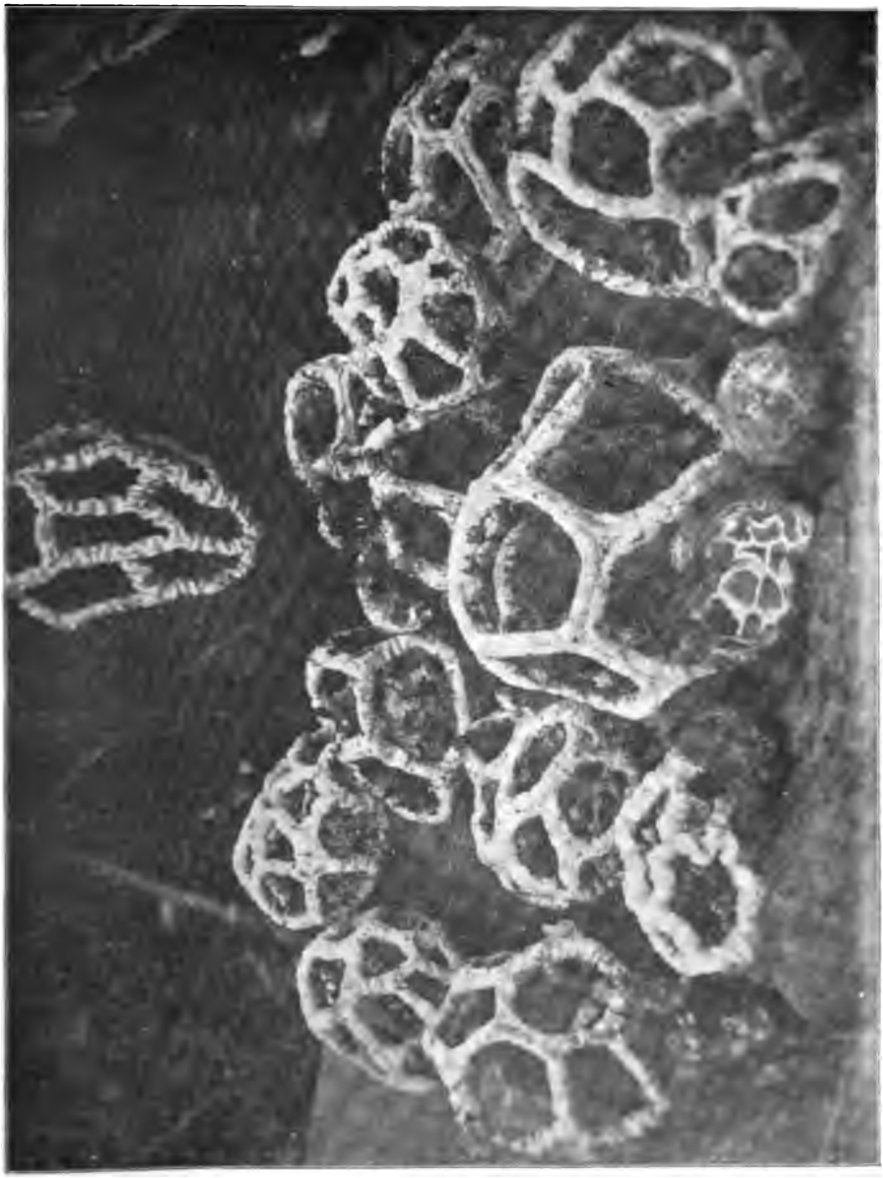

Fig. 78.

CLATHRUS CIBARIUS.
(Reduced about one-half.)

cibarius, but the arms of the upper meshes are narrower than those of the lower, and the latter are somewhat columnar, so that the lower meshes are elongated.

AFRICAN FORM(?).—At the British Museum there is a plant from Africa which, if not a form of Clathrus cibarius, is very close. There is a sketch with it which is yellowish (and I understand that the New Zealand type form is white), but otherwise it seems to be the same.

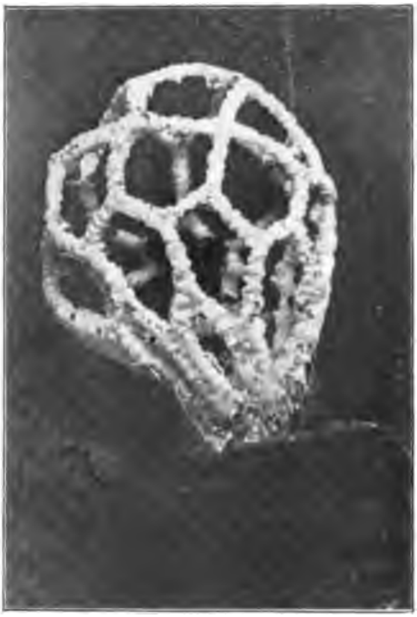

Fig. 80.

CLATHRUS CHRYSOMYCELINUS.

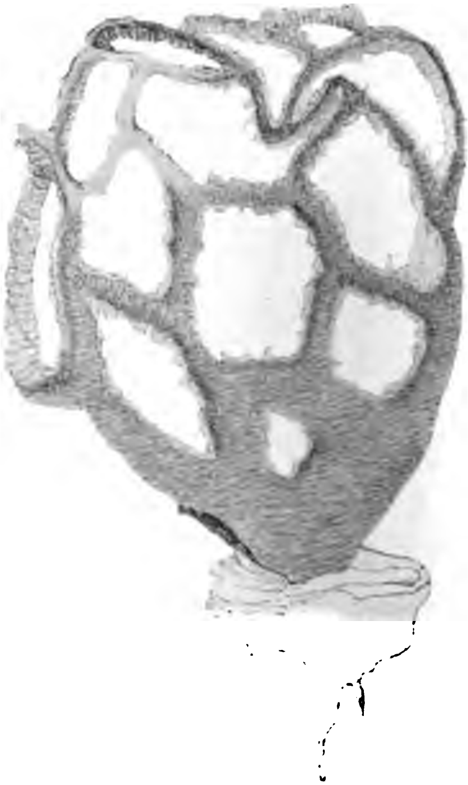

Fig. 81.

CLATHRUS PREUSSII.

CLATHRUS GRACILIS (Fig. 79).—Color white or pale. Receptacle large, globose, with large meshes. The branches of the mesh are flattened, very narrow and slender, and vary from 2 to 3 mm. in breadth. Clathrus gracilis is the most common phalloid in Australia. There are numerous collections at Kew, and it reaches me from several collectors. It is very much like Clathrus cibarius of New Zealand, in fact might be considered as a small form of it. It does not seem to occur in New Zealand. It is reported from South Africa, and at

Paris there is a very poor specimen, which has been called Clathrus Fischeri, but which appears to be Clathrus gracilis. The specimen is too poor to judge, however. Notwithstanding that Clathrus gracilis is the most common phalloid in Australia, we know of no photograph of it and have to resort to one made from alcoholic material, devoid of volva, which gives only a vague idea of the plant.

CLATHRUS CHRYSOMYCELINUS (Fig. 80).—Receptacle white, with large, polygonal meshes; those below somewhat lengthened. The receptacle arms are united at the base. Mycelium described as being bright golden yellow, hence the specific name. This species is only known from Brazil. Father Schupp finds it, and he writes me the mycelium is not always yellow.

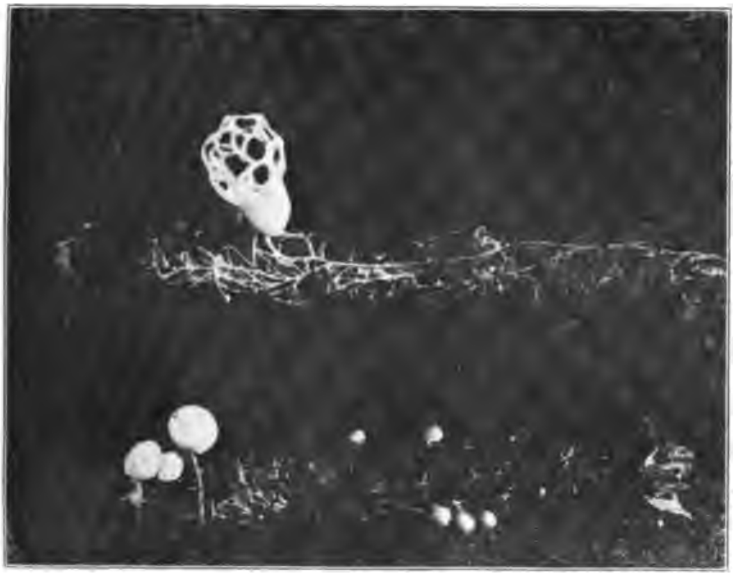

Fig. 82.
CLATHRUS DELICATUS.

CLATHRUS PREUSSII (Fig. 81).—This species from Kamerun, Africa, is one of the few white species of Clathrus known. The receptacle has broad, flat arms that are more narrow above. The figure which was published by Fischer shows the plant with the volva cut away. It is only known from the original collection in alcohol at Berlin. The bars of the network are cellular (not tubular) and have a somewhat quadrilateral shape, different from all other known species of Clathrus.

CLATHRUS DELICATUS (Fig. 82).—This unique little Clathrus is the smallest of the genus and disputes with Mutinus xylogenus the distinction of being the smallest phalloid known. It occurs only in Ceylon as far as known. The color is white, and the structure of the arms is tubular, hence it should be included in the genus Ileodictyon if taken out of Clathrus. The gleba is collected in little globose masses at the nodes of the net.

THE GENUS SIMBLUM.

The genus Simblum can be described in a few words as being a Clathrus on a stalk. In most of the species known the meshes are more compact than is usual in Clathrus. The genus Simblum was originally known from Mauritius, then from South America, Java. and finally from the United States. At Kew we found an unnamed species from Africa, and there is a doubtful one from Australia. It can be divided into two series according to the color, yellow and red, which seem distinct and do not run into each other. However, the red series has pale or white forms.

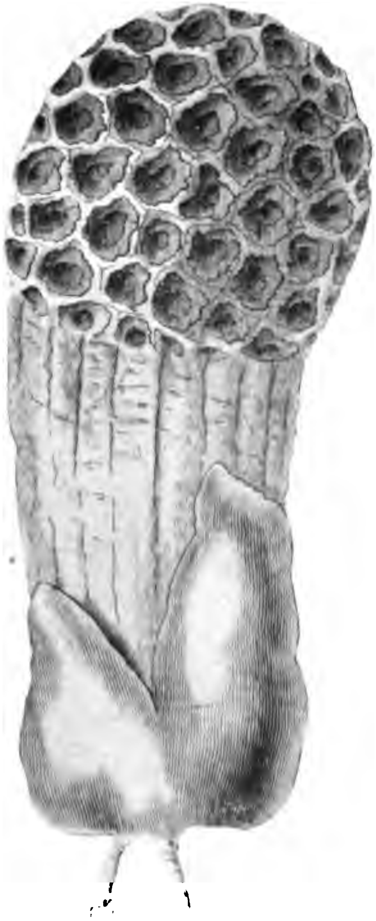

Fig. 83.

SIMBLUM PERIPHRAGMOIDES.

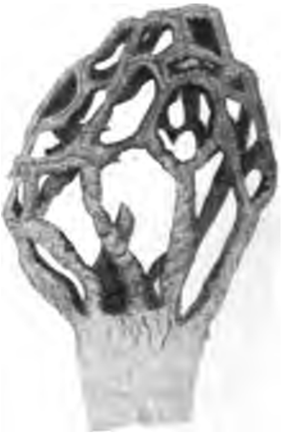

Fig. 87.

SIMBLUM MÜLLERI.

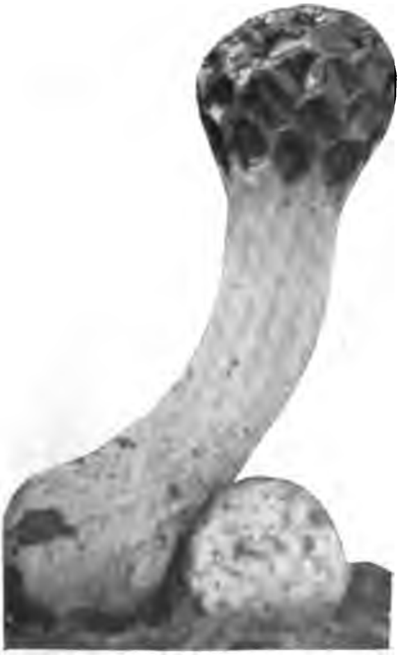

Fig. 84.

SIMBLUM GRACILE.

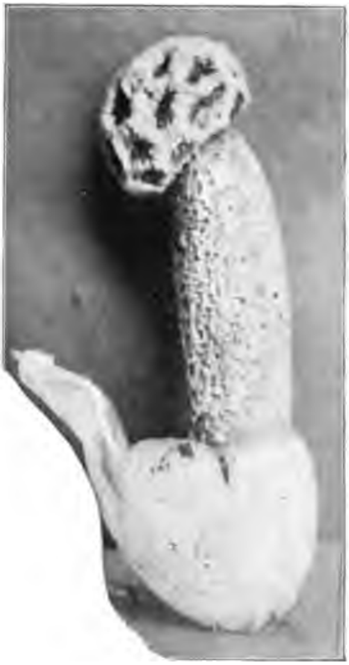

Fig. 85.

SIMBLUM TEXENSE.'

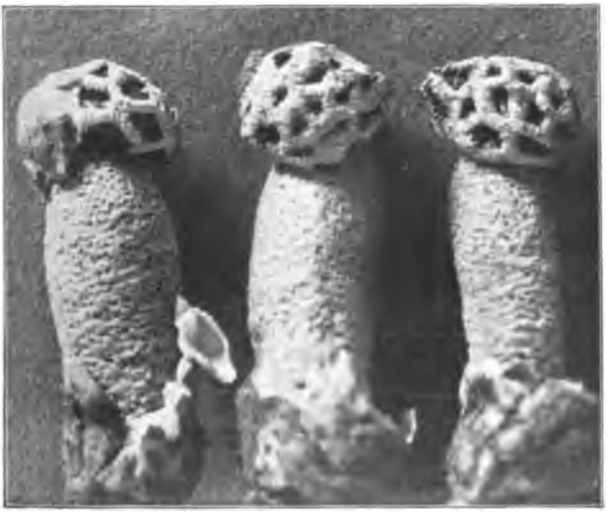

Fig. 86.

SIMBLUM SPHAEROCEPHALUM.

SIMBLUM PERIPHRAGMOIDES (Fig. 83).—Volva, white. Stipe 3 to 4 inches long by 2 broad, hollow, striate, yellow. Receptacle globose, with small meshes, yellow. This species, which was originally from Mauritius, was sent to Hooker and published in 1831. It is evidently rare in Mauritius, for Dr. O'Connor, who resides there and has collected several other phalloids of this island, but lately found it. The following species, which is common in Java, I at first thought was distinct from its slender form, but at Upsala I have recently seen a series of alcoholic specimens from Java, some so much like the original specimens that I now think them to be one species.

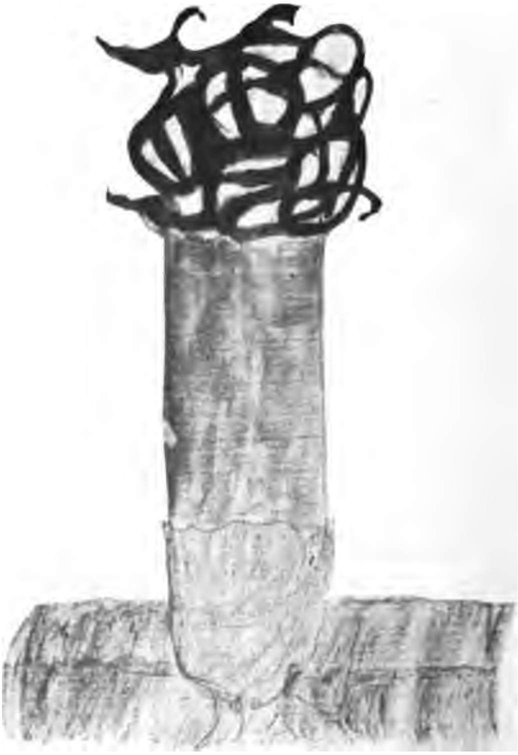

Fig. 88.

SIMBLUM CLATHRATUM.

SIMBLUM GRACILE (Fig. 84).—This has all the characters of the previous excepting the slender form. It is yellow, with a globose head of small meshes. It is a very common species in Java, Ceylon, and India, and has been reported from China. I am convinced, from an examination of a series of alcoholic specimens from Java, at Upsala, that it can not be kept distinct from the preceding species.

SIMBLUM TEXENSE (Fig. 85).—This species, which is only known from Texas, has the same yellow color character as the preceding. It differs in the nature of the network (best shown in our figures) and in the clathrate portion abruptly contracted into the stipe. An excellent account of it has been given by Professor Long.

SIMBLUM SPHAEROCEPHALUM (Fig. 86).—This species differs from those that precede by being red, though pale or white forms occur. It was first noted in South America, where it is an extremely common plant. Then it was published from the United States,[13] where it is rare, and it reached me from the Bahamas. In shape it is the same as Simblum Texense, and the photographs without color notes could not be told apart.

SIMBLUM MÜLLERI (Fig. 87).—This species, which is known from a drawing made from a dried specimen from Australia, is very different from all others in its open network. In its general appearance it is close to Clathrus pusillus, excepting that the clathrate portion is borne on a distinct though short stem . When the phalloids of Australia are well known, it may be found that Clathrus pusillus varies in this respect and that this is really only a stalked form.

SIMBLUM CLATHRATUM (Fig. 88).—Stem hollow, pale reddish tint, 2½ cm. thick x 7 cm. high. Receptacle a loose, clathrate structure, with large meshes to the net and slender branches. Color, bright red. The clathrate portion is fragile and easily broken. The specimen grew in the botanical garden at Old .Calabar, Africa. It is the first red Simblum known from Africa, although the original species of the genus came from Mauritius. It was a yellow plant. The only similar plant known is Simblum sphaerocephalum from America, which differs widely in having a compact net of small meshes. The specimen and a colored drawing by J. W. Holland are at Kew.

THE GENUS COLUS.

This genus is a Clathrus supported on columns which are united at the base into a stipe. Only one species is known, and that only from the Mediterranean regions.

COLUS HIRUDINOSUS (Figs. 89 and 90).—This is a small phalloid, that, as far as is known, grows only in the Mediterranean regions. Originally from Corsica, it was named from Southern France. It has been found in Algeria, and Father Torrend, of Portugal, has recently discovered it abundant in the sand. In Corsica, the original observer stated, it grew only on manure, but the other records are from unnamed places. The color is red; the other characters are all those of the genus and are best shown in our photographs.

In some publications, the genus Colus includes plants that in my opinion have very little resemblance or relation to the original species. These we have separated under the name Pseudocolus.

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[13] The only stations known are Long Island, N. Y., Gerard; Nebraska, J. M. Bates; Kansas, E. E. Bartholomew; Washington, D. C., W. H. Scudder; Talbot County, Maryland, Chas. McIlvaine. When any one finds this rare plant in the United States I request that it be reported to me so that we can keep a record of its known stations.

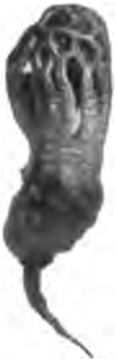

Fig. 89.

COLUS HIRUDINOSUS.
(Natural size.)

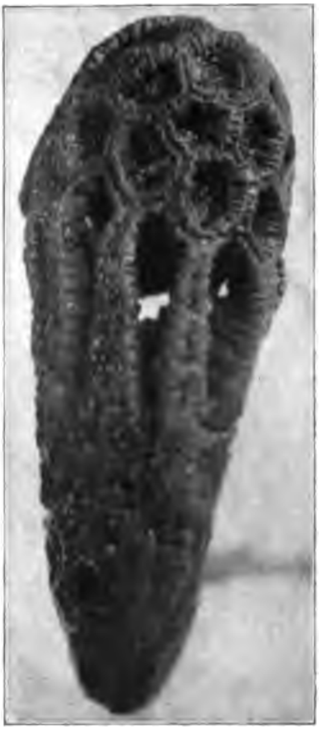

Fig. 90.

COLUS HIRUDINOSUS.
(Enlarged.)

THE GENUS KALCHBRENNERA.

This is a very peculiar genus, known only from South Africa, and but one species. It has a stipe bearing a clathrate structure similar to the genus Simblum, but from the net proceed large, knobbed projections.

KALCHBRENNERA CORALLOCEPHALA (Figs. 91 and 92).—The only species grows in South Africa, and there appears to be rather a frequent plant. It is a very showy plant, of a bright red color in all its parts. The gleba covers the outer portion of the net and to an extent hides the network. It was a number of years before its correct structure was known, and it was Kalchbrenner who made a good picture of it and first showed it.

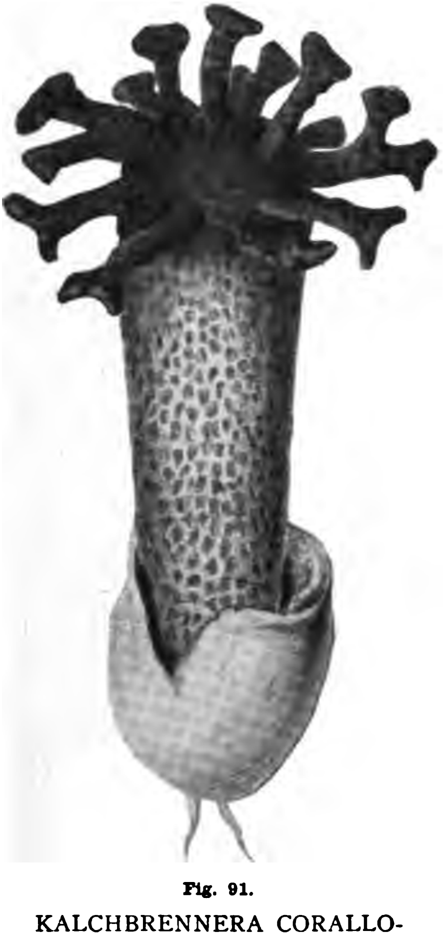

Fig. 91.

KALCHBRENNERA CORALLO-
CEPHALA.

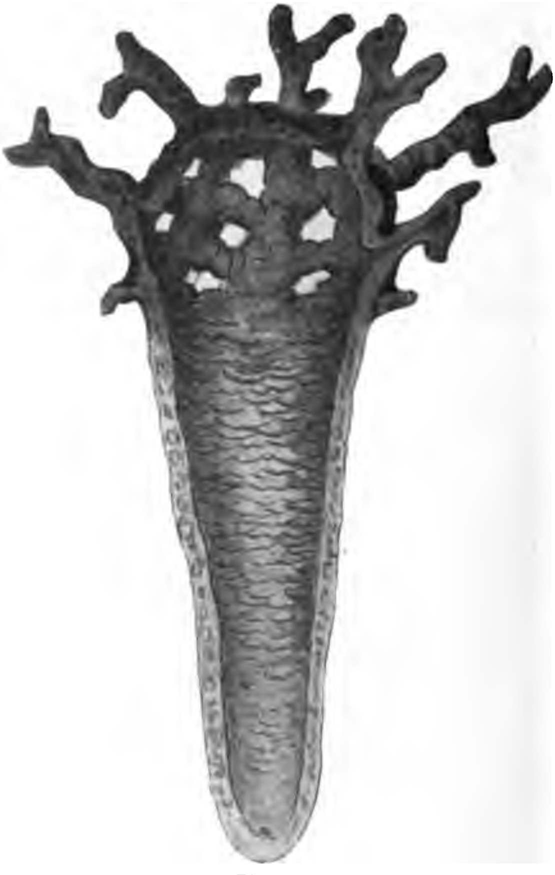

Fig. 92.

KALCHBRENNERA CORALLOCEPHALA.
(Section.)

RELATED PLANTS.

It is a disputed question whether Phallogaster saccatus is a phalloid or not. It has no volva as other phalloids have, hence is excluded by some who are theorizing on such things. I do not believe that any one familiar with the fresh plant will ever place it anywhere except with the phalloids. It has the same greenish, fetid gleba that is associated with the phalloids, the same spores and basidia, and it deliquesces in the same way. It seems to me that its relations are entirely with the phalloids, notwithstanding it has no volva.

THE GENUS PHALLOGASTER.

Plants devoid of a volva, the gleba borne in the inner tissue. Peridium white, smooth. In ripening the inner tissue and gleba deliquesce, and the latter adheres to the inner side of the peridium, which breaks irregularly and exposes the adhering gleba.

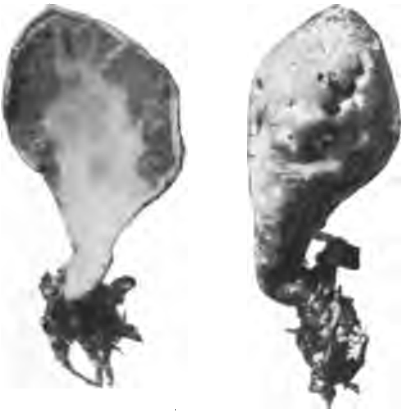

Fig. 93.

PHALLOGASTER SACCATUS.

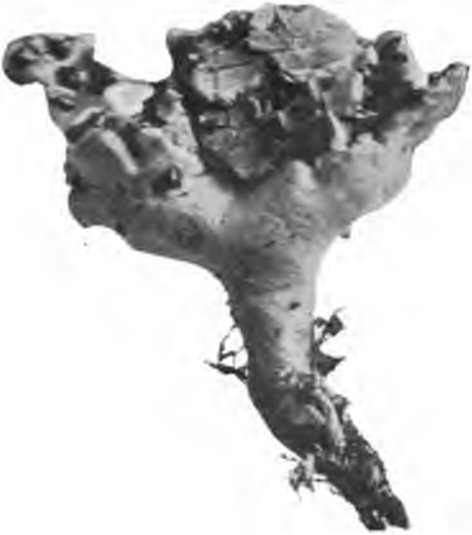

Fig. 94.

PHALLOGASTER SACCATUS.
(After dehiscence.)

PHALLOGASTER SACCATUS (Figs. 93 and 94).—This species occurs only in the United States and Canada, as far as known, and it is a rare plant there. It has only been known for a few years. I think there can be no trouble in identifying it from our photographs. Another species has been recently published, which appears to me to be rather a depauperate form.

APPENDIX I.

GEOGRAPHICAL DISTRIBUTION.

The real study of the phalloids, as I view it, is the correct characters of the species, the simplest grouping of them into genera, and their distribution. We present a synopsis of the number of phalloids known to occur in various countries, and where the same species occurs in different countries it is included in each. We include as different phalloids all the various forms named in this pamphlet, and all the alleged species so named, whether doubtful or well known.

General Distribution.

When the subject is well known, I think, it will be found that several species are of very wide distribution, but at present we only know two.

Phallus indusiatus occurs without doubt in every tropical country of the world. We give on page 18 the countries from which we have seen specimens, and the list does not embrace perhaps half of the countries where it occurs.

Phallus rubicundus (under the names aurantiacus, gracilis, etc.) also seems to occur in most warm countries.

	Europe.	North America.	West Indies.	South America.	Australia and New Zealand.	Africa.	Ceylon and India.	Japan and China.	East Indies.
Anthurus,	..	..	..	..	3	..	I	..	..
Aseroe,	..	..	..	..	6	I	2	2	2
Clathrus,	I	I	4	5	3	4	2	..	I
Clautriavia,	..	..	..	..	I	..	I	..	I
Colus,	I	..	..	..	..	I	..	..	..
Floccomutinus,	..	..	..	..	..	I	..	..	..
Itajahya,	..	..	..	I	..	..	..	..	..
Jansia,	..	..	..	..	I	..	I	I	2
Kalchbrennera,	..	..	..	..	..	I	..	..	..
Laternea,	..	I	3	3	I(?)	I	..	I	..
Lysurus,	I	I	..	3	2	I	I	I	..
Mutinus,	I	3	..	3	3	..	I	2	3
Phallogaster,	..	I	..	..	..	..	..	..	..
Phallus,	2	5	2	8	10	6	3	5	9
Pseudocolus,	..	..	..	I	I	I	..	..	2
Simblum,	..	2	I	I	I	2	..	..	I
Total,	6	14	10	25	31	19	12	12	21

Europe.

There are but six phalloids in Europe (including one form). Phallus impudicus is the most common and widespread. The form Phallus imperialis is rare and local. Mutinus caninus is not rare. Clathrus cancellatus is of a southern range. It occurs mostly in southern France, Italy, etc. Colus hirudinosus is confined to the Mediterranean region. It occurs in Corsica, Southern France, Portugal. Lysurus borealis is probably an introduced species. It is known from one collection in Germany and two in England.

United States and Canada.

We have fourteen phalloids in our country. Phallus Ravenelii and Phallus duplicatus are the most frequent. The form Phallus imperialis, which with us replaces Phallus impudicus of Europe, is of a Western range, found in California, Colorado, and Texas. But one Eastern station is known, Washington, D. C. Mutinus elegans is our most common Mutinus in rich woods. Mutinus caninus is an Eastern species, and Mutinus Ravenelii is local and rare. Laternea columnata is common in the South, and Clathrus cancellatus is very rare and only known with certainty from the South. Phallus rubicundus seems to be fairly common in the South. Simblum sphaerocephalum is very rare. A list of known stations is given on page 67. Simblum Texense is known only from Texas. Lysurus borealis seems to be an introduced plant. Of late years it has been found a number of times, chiefly in the East and in cultivated stations. Phallogaster saccatus is of rare occurrence. In addition I have a specimen in alcohol from Florida, species not sure, but probably Phallus gracilis.

West Indies.

The phalloids of the West Indies are not well known. Undoubtedly when well observed, several of the Brazilian species will be found in the West Indies. Clathrus crispus (and a doubtful form, pseudocrispus); Clathrus Americanus, recently found in the Bahamas by Mr. Brace; Clathrus guttulatus, known only from an old drawing; Phallus indusiatus, common; Phallus rubicundus, probably common; Laternea columnata, common; Laternea pusilla, known from one collection; Laternea triscapa, known only from an old drawing, and Simblum sphaerocephalum, recently collected in the Bahamas by Mr. Brace.

South America.

Most excellent work has recently been done on the phalloids of Brazil by Moeller, and to this work is due most of our knowledge of South American phalloids. He has published in a superb manner Clathrus chrysomycelinus, Pseudocolus Garciae, Laternea columnata, Laternea rhacodes, Mutinus bambusinus, Phallus subtilis, Phallus glutinolens, Phallus indusiatus (and a form, Moelleri), Phallus callichrous (which is probably only a color form of indusiatus), and Itajahya galericulata, a genus only known from South America.

Simblum sphaerocephalum is a most common phalloid in South America, but does not seem to have been found by Professor Moeller. Clathrus Americanus is a recent species from Rev. F. A. Schupp, Brazil.

Rev. J. Rick finds in his locality (Sao Leopolda) the following: Simblum sphaerocephalum, Phallus indusiatus, Pseudocolus Garciae, Laternea columnata, Laternea rhacodes, and Clathrus Americanus.

There have been several imperfectly known phalloids from South America. We would list Phallus Farlowii, Mutinus australis, Lysurus Sanctae-Catherinae, Phallus roseus (a form of indusiatus), Mutinus xylogenus, Lysurus cruciatum, Phallus campanulatus, Lysurus Clarazianus, Clathrus affinis (a form of cibarius, known only from a specimen in the British museum), Laternea Spegazzini, and Laternea crispus. In addition, several have been proposed by Spegazzini, but they are mostly only word-descriptions, and nothing can be told about them. For me an unillustrated phalloid has no place excepting in the rejected columns. There has also been a "new genus," Alboffiella, illustrated by Spegazzini. Professor Fischer has suggested, not without reason it seems to me, that it was based on a Phallus with an accidental volva cap. Robert E. Fries suggests it was based on Itajahya galericulata. If true, in either case, the work was very poorly done.

Australia and New Zealand.

I consider the phalloids of Australia and New Zealand for the most part very imperfectly and inaccurately known. The new species were mostly proposed forty or fifty years ago and illustrated by figures reconstructed from dried specimens, often inaccurate it seems to me, and nothing since has been learned of them. The subject has gotten into such a condition that the local workers in these countries seem to be able to make but very little of their species, and the result is there have been very few original papers by the mycologists of these countries. It is time our friends there observed their phalloids and gave us good accounts and photographs of them. If Australian mycologists will take as a model the photographs and account given on page 42 by Professor D. McAlpine, of Anthurus aseroeformis, and supply similar photographs and accounts, it will only be a few years until we have a much better knowledge of the subject.

The two most frequent phalloids are Clathrus cibarius and Clathrus gracilis. the former in New Zealand, the latter in Australia. Neither has been satisfactorily illustrated. Anthurus aseroeformis, a rare species but well known, due to Professor McAlpine. Phallus indusiatus is a frequent plant, but the forms and color forms are not worked out. The genus Aseroe is at home in Australia. It seems to take very different forms, but their value in classification is not known. With the exception of the above, I consider all the other Australian species more or less doubtful and little known, viz: Phallus impudicus, Phallus rubicundus, Phallus multicolor, Phallus callichrous, Phallus Rochesterensis, Phallus discolor, Phallus calyptratus, Phallus retusus, Phallus quadricolor, Mutinus pentagonus, Mutinus curtus, Mutinus papuasius, Jansia annulata, Lysurus Australiensis, Lysurus (unnamed), Anthurus Muellerianus, Anthurus Archeri, Aseroe (all the five recorded forms, rubra, pentactina, Hookeri, Muelleriana, lysuroides), Laternea columnata (very ??), Pseudocolus Rothae, Clathrus pusillus, Simblum Mülleri. In addition, there is a curious species, Clautriavia Lauterbachii, only known from an egg from the neighboring island of New Guinea, and a pale Aseroe (pallida) is recorded from New Caledonia.

Samoa.

I have spent two winters in Samoa and have hunted the fungi thoroughly. I am satisfied that Phallus indusiatus is the only common phalloid that grows on the island, and it is not at all rare. In the museum at Berlin is a specimen labeled Clathrus gracilis (and it seems to be correct), also a Mutinus (unnamable). Both genera must be very rare in Samoa, as I found neither.

Africa.

Many years ago Simblum periphragmoides was well illustrated from Mauritius, and was only recently found again. A slender form is very frequent in the East Indies. Kalchbrennera corallocephala, a most striking species, was well illustrated by Kalchbrenner thirty years ago. Phallus indusiatus is a common species and has reached me several times from Africa. Colus hirudinosus occurs in North Africa. Lysurus Woodii, Laternea Angolensis, Phallus subacutus, and Phallus canariensis were imperfectly published years ago, and nothing has been added to them since.

In recent years Africa has been a fertile field for "new species," but the work has not been done as it should have been. Such work would have passed forty years ago, but it is out of date now. The following have been added, mostly in this manner, in comparatively recent years: Floccomutinus Zenkeri, Phallus rubicundus (?), Clathrus camerunensis, Clathrus pseudocancellatus, Clathrus Preussii, Clathrus gracilis (?), Simblum clathratum, Pseudocolus fusiformis, Phallus callichrous, Clathrus cibarius(?). Fine specimens of many of these are in alcohol in the museum at Berlin.

Mr. Chas. O'Connor has been observing the phalloids of Mauritius. He finds the only common one to be Phallus gracilis. More rarely he has observed Phallus indusiatus and Phallus Mauritianus, a related plant. He has only recently rediscovered Simblum periphragmoides which was originally from Mauritius, but is very rare there.

Ceylon.

For many years we have had a very imperfect knowledge of the phalloids of Ceylon, but a very recent paper by T. Petch has set the matter right. The following species occur in Ceylon: Jansia rugosa (rare, and considered by Petch to be Mutinus proximus), Mutinus proximus (known only from dried specimens and sketch), Phallus tenuis (only previously known from Ceylon from dried specimen at Kew, but recently again reported from Ceylon), Phallus indusiatus, the most common phalloid and takes many color forms, viz: callichrous and multicolor), Clautriavia merulina (common in the Botanic Gardens at Peradeniya), Simblum gracile, common, Lysurus Gardneri (rare in Ceylon, but most abundantly represented in the museums at Kew, there being 25 specimens), Aseroe Zeylandica, rare in the elevated regions, Aseroe arachnoidea, very rare. In addition the unique little Clathrus delicatus is only known from Ceylon.

India.

Seventy years ago Perrottet sent Montagne a few phalloid sketches and dried specimens on which were based Phallus rubicundus (published as aurantiacus), Anthurus Calathiscus (supposed to have been very inaccurately published). In addition a few specimens of Phallus indusiatus have reached Europe from India, and these are all, I think, that are known from India. At the British Museum there are ten times as many specimens of extinct elephant remains from India as there are of the *live phalloids* that every naturalist in India must observe.

Mr. Hutchins writes me from North Bengal that Phallus indusiatus is common, but is the only phalloid he finds. Mr. G. H. Krumbiegel sent me from North Bengal a dried phalloid which, while I would not attempt to reconstruct it, I recognize as a genus unknown.

Java.

From no country in the world have we had a better account of the phalloids than from Java, which was published by Penzig. The following were well illustrated and described by him: Mutinus bambusinus, Mutinus Fleischeri, Jansia elegans, Jansia rugosa, Phallus tenuis, Phallus costatus (form?), Phallus favosus (form?), Phallus indusiatus, Clautriavia merulina, Phallus multicolor, Simblum gracile (form), Pseudocolus Javanicus, Aseroe arachnoidea.

Dr. Chas. Bernard has given us a good photograph and account of Clathrus Treubei, and has sent me a collection of the Javanese species in alcohol, from which some good photographs have been made.

Aseroe Zeylandica (under the name Junghuhnii) was published from Java many years ago, but is very rare and only rediscovered by Dr. Bernard recently. Pseudocolus rugulosus is based on an old drawing from Java, and no specimen is known. From the neighboring islands, Mutinus borneensis is vaguely described from Borneo and Phallus celebicus from the Celebes.

Dr. Chas. Bernard gives the following synopsis of the relative frequency of the phalloids he has observed in Java: Mutinus bambusinus, Clautriavia merulina, Phallus indusiatus, and Simblum gracile are common throughout the season, though more abundant, of course, during the rainy season. Aseroe arachnoidea, Jansia elegans, Jansia rugosa, Phallus multicolor, and Clathrus Treubei are rarer species and will probably only be found during the rainy season. Aseroe Zeylandica is a very rare phalloid and only recently rediscovered.

Japan.

An account of the phalloids of Japan was published in Mycological Notes, page 400. It was based on notes, drawings, and specimens from Professors Kusano, Gono, and Yasuda. The following were included: Phallus indusiatus, Phallus impudicus, Phallus rugulosus, Phallus tenuis (rare), Jansia boninensis (as Mutinus), Lysurus Mokusin, and Laternea bicolumnata. In addition, Phallus rubicundus under the name aurantiacus has been said to grow in Japan.

China.

Little is known as to the phalloids of China, although Lysurus Mokusin from China was among the first foreign phalloids figured.

Some alcoholic specimens were sent to Patouillard at Paris a few years ago from Tonkin, and the following species recorded: Aseroe Zeylandica, Phallus indusiatus, Phallus gracilis, Mutinus bambusinus, Mutinus minimus, Mutinus borneensis.

APPENDIX II.

LOST, STRAYED, OR STOLEN.

The following phalloids have not been heard from since they were originally exploited and grave fears are entertained as to their survival. Vague rumors have been circulated of one or two of them having been seen, but when traced to the source have usually resulted from a mistaken identification. Any one noticing a stray phalloid in their neighborhood is requested to seize it and send it in with such notes and marks as may lead to its identification.

	Whence Exploited	Has not been heard from for
Anthurus Müllerianus	Australia	Thirty years.
Anthurus Archeri	Australia	Fifty years.
Anthurus Calathiscus	India	Sixty-eight years.
Clathrus pusillus	Australia	Sixty-five years.
Laternea pusilla	Cuba	Forty years.
Laternea triscapa	West Indies	Eighty-seven years.
Laternea angolensis	Africa	Forty years.
Lysurus cruciatus	French Guiana	Sixty-five years.
Lysurus Clarazianus	South America	Thirty-six years.
Lysurus Sanctae Catherinae	South America	Twenty years.
Lysurus Woodii	South Africa	Thirty years.
Mutinus curtus	Australia	Sixty-five years.
Mutinus papuasius	Australia	Thirty years.
Mutinus discolor	Australia	Thirty years.
Mutinus xylogenus	French Guiana	Fifty-five years.
Phallus Daemonum	Amboy	One hundred and sixty-six years.
Phallus quadricolor	Australia	Twenty-six years.
Phallus calyptratus	Australia	Twenty-six years.
Phallus retusus	Australia	Twenty-five years.
Phallus subuculatus	North Africa	Sixty years.
Pseudocolus fusiformis	Reunion	Thirty years.
Simblum Mülleri	Australia	Twenty years.

APPENDIX III.

SYNONYMS.

There have been nearly three hundred names proposed for phalloids and only about one hundred have been retained in this pamphlet. The other two-thirds are, in our opinion, superfluous. It is an easy matter to propose a new name, but when once proposed it is impossible to ever get rid of it. Writers can refer it to "synonymy" all they please, but the next man that comes along has to dig it up and go all over it again, for no two men ever agree as to all the details, and each man is entitled to his own opinion.

Many of the following names are the discoveries made by those who discover "new species," which seem to me to have been "new" chiefly to the discoverer. A large part of the synonyms are from changing plants from one genus to another or making new genera out of sections of old genera. Personally we do not maintain many of these innovations, for the old established genera seem better to us. Of the new genera proposed in the last twenty years we only maintain Itajahya, Jansia, Phallogaster, Clautriavia, Floccomutinus, and Pseudocolus. (The latter we had the assurance to propose ourselves.) Professor Fischer has worked over this same ground and reduced many of these same names to synonymy, and while we agree with him in many instances we have copied him in none, for in every case we have looked up the evidence and formed our own opinion. We have not been as free as he in reducing species, for perhaps twenty names recognized as good in this pamphlet Professor Fischer puts in synonymy. While we suspect many of these have little value, we give them, in all instances, the benefit of the doubt.

There is one class of "new species" exploiters that I have not bothered much with—those who propose new species without illustrating them. In a subject such as the phalloids, where a good illustration tells most of the story, there is no excuse for any one to try to describe a phalloid in words. It ought to be a recognized crime, with a heavy penalty. Such species are listed here as "Nomina nuda." The phalloid fakers who fake up pictures are perhaps worse. The following names are those which in our opinion should be placed in synonymy and the reasons.

Anthurus australiensis	See Lysurus.
Anthurus borealis	See Lysurus.
Anthurus Clarazianus	See Lysurus.
Anthurus cruciatus	See Lysurus.
Anthurus Sanctae Catherinae	See Lysurus.
Anthurus trifidus	Nomen nudum.
Anthurus Woodii	See Lysurus.
Aporophallus subtilis	See Phallus.
Alboffiella argentina	Supposed to be a break.
Aseroe actinobolus	=Aseroe pentactina.
Aseroe Ceylanica	See Aseroe Zeylandica.
Aseroe Calathiscus	See Anthurus.
Aseroe corrugata	Nomen nudum.
Aseroe Junghuhnii	=Aseroe Zeylandica.
Aseroe multiradiata	=Aseroe Zeylandica probably.
Aseroe viridis	=Aseroe Hookeri.
Aserophallus cruciatus	See Lysurus.
Blumenavia rhacodes	See Laternea.
Blumenavia usambarensis	=Laternea angolensis(?).
Calathiscus Sepia	See Anthurus Calathiscus.
Calathiscus Puiggarii	Nomen nudum.
Caromyxa elegans	See Mutinus.
Clathrella camerunensis	See Clathrus.
Clathrella crispa	See Clathrus.
Clathrella chrysomycelina	See Clathrus.
Clathrella delicata	See Clathrus.

Clathrella Muelleri	See Simblum.
Clathrella pseudocancellata	Nomen nudum.
Clathrella Preussii	See Clathrus.
Clathrella pusilla	See Clathrus.
Clathrella Treubei	See Clathrus.
Clathrus angolensis	See Laternea.
Clathrus albidus	=Clathrus gracilis.
Clathrus australis	Nomen nudum.
Clathrus Baumii	Nomen nudum.
Clathrus Berkeleyi	=Laternea pusilla.
Clathrus Brasiliensis	=Laternea columnata.
Clathrus columnatus	See Laternea.
Clathrus colonnarius	=Laternea columnata.
Clathrus Fischeri	=Clathrus gracilis(?).
Clathrus hirudinosus	See Colus.
Clathrus intermedius	Nomen nudum.
Clathrus parvulus	Too poorly illustrated.
Clathrus pseudocancellatus	Nomen nudum.
Clathrus Tepperianus	=Clathrus gracilis.
Clathrus triscapus	See Laternea.
Clathrus trilobatus	=Laternea columnata.
Colus fusiformis	See Pseudocolus.
Colus Garciae	See Pseudocolus.
Colus Gardneri	See Lysurus.
Colus Javanicus	See Pseudocolus.
Colus Muelleri	See Simblum.
Colus Rothae	See Pseudocolus.
Colonnaria truncata	Rafinesque's ravings.
Colonnaria urceolata	Rafinesque's ravings.
Corynites brevis	=Mutinus Ravenelii.
Corynites Curtisii	=Mutinus elegans.
Corynites elegans	See Mutinus.
Corynites Ravenelii	See Mutinus.
Cryptophallus albiceps	=Phallus imperialis.
Cynophallus bambusianus	See Mutinus.
Cynophallus caninus	See Mutinus.
Cynophallus papuasius	See Mutinus.
Dictybole texensis	A phalloid fake.
Dictyophallus aurantiacus	=Phallus rubicundus.
Dictyophallus discolor	See Phallus.
Dictyophora bicampanulata	=Phallus indusiatus.
Dictyophora brasiliensis	=Phallus indusiatus.
Dictyophora Braunii	=Phallus indusiatus.
Dictyophora callichrous	See Phallus.
Dictyophora campanulata	=Phallus indusiatus.
Dictyophora chlorocephala	=Phallus callichrous.
Dictyophora collaris	=Phallus duplicatus.
Dictyophora Daemonum	See Phallus.
Dictyophora duplicata	See Phallus.
Dictyophora echinata	=Phallus indusiatus.
Dictyophora Farlowii	See Phallus.
Dictyophora irpicina	=Clautriavia merulina.
Dictyophora Lilloi	=Phallus indusiatus.
Dictyophora merulina	See Clautriavia.
Dictyophora multicolor	See Phallus.
Dictyophora nana	=Phallus indusiatus.
Dictyophora phalloidea	=Phallus indusiatus.
Dictyophora radicata	=Phallus indusiatus.
Dictyophora rosea	=Phallus indusiatus (form).
Dictyophora speciosa	See Phallus indusiatus.
Dictyophora subuculata	See Phallus.

Dictyophora tahitensis	=Phallus indusiatus.
Echinophallus Lauterbachii	See Clautriavia.
Floccomutinus Nymanianus	=Jansia rugosa.
Foetidaria coccinea	=Simblum sphaerocephalum.
Hymenophallus alboindusiatus	=Phallus indusiatus.
Hymenophallus brasiliensis	=Phallus indusiatus.
Hymenophallus duplicatus	See Phallus.
Hymenophallus Hadriani	=Phallus impudicus.
Hymenophallus indusiatus	See Phallus.
Hymenophallus radicatus	=Phallus indusiatus.
Hymenophallus roseus	=Phallus indusiatus (form).
Hymenophallus speciosus	=Phallus indusiatus.
Hymenophallus subuculatus	See Phallus.
Hymenophallus tahitensis	=Phallus indusiatus.
Hymenophallus togatus	=Phallus duplicatus.
Hymenophallus tunicatus	=Phallus indusiatus.
Ileodictyon cibarium	See Clathrus.
Ileodictyon gracile	See Clathrus.
Ithyphallus aurantiacus	=Phallus rubicundus.
Ithyphallus Balansoe	=Phallus rubicundus.
Ithyphallus calyptratus	See Phallus.
Ithyphallus campanulata	See Phallus.
Ithyphallus canariensis	See Phallus.
Ithyphallus celebicus	See Phallus.
Ithyphallus coralloides	=Phallus rubicundus.
Ithyphallus costatus	See Phallus.
Ithyphallus cucullatus	=Phallus Ravenelii.
Ithyphallus favosus	See Phallus.
Ithyphallus glutinolens	See Phallus.
Ithyphallus impudicus	See Phallus.
Ithyphallus Lauterbachii	See Clautriavia.
Ithyphallus Muellerianus	=Phallus retusus.
Ithyphallus Novae Hollandiae	=Phallus gracilis.
Ithyphallus purpuratus	=Phallus imperialis.
Ithyphallus quadricolor	See Phallus.
Ithyphallus Ravenelii	See Phallus.
Ithyphallus retusus	See Phallus.
Ithyphallus rubicundus	See Phallus.
Ithyphallus rugulosus	See Phallus.
Ithyphallus sanguineus	=Phallus rubicundus?
Ithyphallus tenuis	See Phallus.
Jansia Nymaniana	=Jansia rugosa.
Jansia Zenkeri	See Floccomutinus.
Kalchbrennera Tuckii	=Kalchbrennera corallocephala.
Kirchbaumia imperialis	See Phallus.
Laternea australis	Nomen nudum.
Laternea pentactina	=effete Clathrus Treubei.
Lysurus Archeri	See Anthurus.
Lysurus argentinus	Nomen nudum.
Lysurus aseroeformis	See Anthurus.
Lysurus Beauvaisi	=Lysurus Mokusin.
Lysurus corallocephalus	See Kalchbrennera.
Lysurus pentactinus	=Anthurus Archeri.
Lysurus Texensis	Nomen nudum.
Mutinus annulatus	See Jansia.
Mutinus boninensis	See Jansia.
Mutinus bovinus	=Mutinus elegans.
Mutinus brevis	=Mutinus Ravenelii.
Mutinus Curtisii	=Mutinus elegans.
Mutinus discolor	See Phallus.
Mutinus elegans (of Java only)	See Jansia.

Mutinus Muelleri .... =Mutinus bambusinus.
Mutinus Nymanianus .... =Jansia rugosa.
Mutinus proximus .... Nomen nudum.
Mutinus proximus (in sense of Petch) .=Jansia rugosa.
Mutinus Watsoni .... Nomen nudum.
Mutinus Zenkeri .... See Floccomutinus.
Omphallophallus Muellerianus .... =Phallus retusus.
Omphallophallus retusus .... See Phallus.
Phallogaster whitei .... =depauperate Phallogaster saccatus.
Phallus aurantiacus .... =Phallus rubicundus.
Phallus bambusinus .... See Mutinus.
Phallus brasiliensis .... =Phallus indusiatus.
Phallus caninus .... See Mutinus.
Phallus collaris .... =Phallus duplicatus.
Phallus curtus .... See Mutinus.
Phallus foetidus .... =Phallus impudicus.
Phallus Hadriani .... Based on a freak.
Phallus irpicinus .... =Clautriavia merulina.
Phallus inodoratus .... =Phallus impudicus.
Phallus iosmos .... =Phallus impudicus.
Phallus merulinus .... See Clautriavia.
Phallus Mokusin .... See Lysurus.
Phallus Muellerianus .... =Phallus retusus.
Phallus Novae Hollandiae .... =Phallus gracilis.
Phallus purpuratus .... =Phallus imperialis.
Phallus radicatus .... =Phallus indusiatus.
Phallus sanguineus .... =Phallus rubicundus (?).
Phallus senegalensis .... =Imagination chiefly.
Phallus speciosus .... =Phallus indusiatus.
Phallus tahitensis .... =Phallus indusiatus.
Phallus truncatus .... =Mutinus unknown.
Phallus tunicatus .... =Phallus indusiatus.
Phallus Watsoni .... Nomen nudum.
Phallus xylogenus .... See Mutinus.
Protubera Maracuja .... (Not for me a phalloid.)
Satyrus rubicundus .... See Phallus.
Simblum australe .... =Simblum sphaerocephalum.
Simblum flavescens .... =Simblum gracile.
Simblum Lorentzii .... =Simblum sphaerocephalum.
Simblum pilidiatum .... =Simblum sphaerocephalum.
Simblum rubescens .... =Simblum sphaerocephalum.
Sophronia brasiliensis .... =Phallus indusiatus.
Staurophallus senegalensis .... =Something unknown.
Xylophallus xylogenus .... See Mutinus.

APPENDIX IV.

LIST OF PHALLOIDS IN THE MUSEUMS.

All specimens are not listed, for some are so uncertain that I feel they should not be recorded. In case a plant has been named from these specimens, I sometimes record it under this name, even if I do not maintain it as a valid species.

KEW, ENGLAND.

Phallus multicolor, 3 collections, Australia—Phallus nanus, type, Andaman Island—Phallus indusiatus, Australia, Africa, British Guiana, Uganda, India, Ceylon, Java, Brazil, Mexico, Surinam Cape, several specimens from each country, also Cuba (? depauperate), Australia (var. Rochesterensis)—Phallus duplicatus, Carolina—Phallus Ravenelii, Connecticut—Phallus truncatus, poor specimens, and a drawing from which it appears to me to be rather a Mutinus—Phallus rubicundus, Southern United States, several—Phallus rubicundus (as aurantiacus), several from Australia and the form gracilis—Phallus impudicus, Australia, one only from Bailey and doubtful, England several (one the type of iosmos), East Indies but very ??, France, Germany—Phallus tenuis, Ceylon, named Phallus pallidus by Berkeley but never published—Phallus aurantiacus, co-type, ex Montagne—Phallus gracilis, South Africa—Mutinus curtus, Australia, type—Mutinus elegans (type of Corynites Curtisii)—Mutinus Ravenelii, type, one with a short apex called brevis—Mutinus bambusinus, nice drawing from Kurz, I think; Java, also dried from Java, also adventitious in hothouses, England—Mutinus caninus, a number from England—Mutinus proximus, type, Ceylon, poor—Mutinus pentagonus (labeled Australiensis) also labeled pentagonus fram Bailey, Australia—Kalchbrennera corallocephala, South Africa, collection and also Kalchbrenner's fine drawing[14]—Simblum gracile, Ceylon, also several specimens from Kurz, Java, and a nice drawing originally named "Thyridocephalus flavescens, Mihi"—Simblum sphaerocephalum, Brazil, Glazion (labeled Simblum Brasiliense, also drawing of the type of S. pilidiatum)—Simblum periphragmoides, type in good condition, Mauritius in Hooker's herbarium—Clathrus pusillus, type, Australia—Pseudocolus rugulosus, type drawing ex Kurz, Java, labeled Clathrus triscapus—Pseudocolus Rothae, two collections and sketch from Bailey—Laternea columnata, Brazil, also (very ???) from Australia, also Cuba, the latter more slender, also several from the United States—Laternea pusilla, type, Cooke—Clathrus cancellatus, England, France—Clathrus pseudocrispus type drawing ex McCatty, Jamaica, also poor specimens—Clathrus crispatus ex Thwaite, Ceylon (published as cancellatus)—Clathrus cibarius, about a dozen collections, all from New Zealand excepting one from Chiloe, an island off the coast of Chile—Clathrus gracilis, several, all from Australia—Clathrus delicatus, type, Ceylon—Clathrus crispus, Cuba, San Domingo, Uruguay—Simblum clathratum, type drawing and specimens, Old Calabar, Africa ex J. H. Holland—Lysurus Gardneri, abundant types, Ceylon—Colus hirudinosus, Corsica, Alpes Maritimes—Lysurus Australiensis, type, Australia—Lysurus Woodii, South Africa ex Wood, and same as co-type of Anthurus Woodii—Aseroe Zeylandica, type, Ceylon—Aseroe rubra, several from Australia—Aseroe Hookeri, type, New Zealand.

BRITISH MUSEUM, LONDON.

Phallus indusiatus from Philippines, Angola (Africa), China, Ceylon, India, Borneo, and St. Vincent (the latter a small form =nana)—Phallus multicolor, type with the original colored sketch and also a colored sketch by Broom—Phallus impudicus, several exsiccated from Europe, also specimens from Britain—Phallus tenuis, Ceylon—Phallus quadricolor, type—Phallus calyptratus, type—Phallus Ravenelii from Ravenel with his original notes—Phallus aurantiacus, Australia—Mutinus caninus, photo ex. Krieger, also several specimens from England and the continent—Mutinus elegans, sketch from Morgan, labeled Ravenelii—Mutinus Ravenelii with a letter from Ravenel stating that the plant has been mis-cited in Grevillea (which is true)—Mutinus proximus, drawing by Broom—Kalchbrennera corallocephala, original description but no specimen from Welwitsch, drawing as reproduced in Trans. Linn. Soc.—Simblum gracile, Ceylon—Laternea columnata, abundant specimen from Ravenel—Laternea Angolensis, original description and drawing (no specimen) from Welwitsch. It was described as "splendida albida"—Simblum Muelleri (?) poor, Australia—Clathrus cancellatus, several specimens from Europe—Clathrus delicatus, co-type, Ceylon—Clathrus gracile, co-type, Australia—Clathrus cibarius, New Zealand, also Chiloe, Chile, also a form (see page 60) Pernambuco, also a specimen and sketch of a very similar species from Mombasa, East Africa. There are no color notes, but the sketch is dull yellow—Clathrus crispus, Vera Cruz, also specimen, poor, so labeled, from Australia, but not the species, I think—Clathrus crispatus, *Yucatan,* dried specimen, but seems the same as the original at Kew from Ceylon—Lysurus Gardneri, co-type, Ceylon—Colus hirudinosus (alcohol) from Meadow Valley, Asia Minor—Aseroe rubra, Australia.

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[14] "The Kalchbrennera is very rare. Only twelve specimens have been found in five years."—Extract from letter from MacOwan.

CRYPTOGAMIC MUSEUM, PARIS, FRANCE.

Aseroe arachnoidea, type specimens in alcohol from Harmand, Cochin China—Anthurus trifidus, in alcohol, type from Japan, Dr. Harmand, specimen is broken, but I think is a Pseudocolus—Aseroe rubra, New Zealand, Raoul—Phallus impudicus, several, France—Phallus Ravenelii. There is an historical specimen more than two hundred years old in the herbarium of Vaillant. It was "Boletus phalloides" and was "ex Canada, 1702"—Phallus aurantiacus, type, India—Mutinus caninus, several, France—Mutinus elegans, type, Ohio, good condition—Mutinus Ravenelii ex Ravenel—Mutinus curtus, fragment from Berkeley—Mutinus xylogenus, types ex French Guiana and drawing (good) from Leprieur—Pseudocolus fusiformis, type drawing from Reunion, all that is known—Lysurus Gardneri ex Berkeley—Laternea triscapa from Chile, the specimen is very small, but probably a small columnata—Laternea columnata ex Ravenel, also Chile—Clathrus gracilis ex Berkeley, also a specimen so referred from New Caledonia, the latter also published as Colus hirudinosus, but so poor it should not have been named—Clathrus cancellatus, a number all from Southern France and one Algeria—Clathrus gracilis, ex Berkeley, Australia, also a very poor specimen ex Africa, similar to gracilis, but too poor to judge. It was named Clathrus Fischeri—Clathrus cibarius, type ex New Zealand, in alcohol, also from Chile!—Lysurus cruciatus, a number of type specimens, but all much broken, French Guiana—Colus hirudinosus, specimen from Pyrenees, Algeria, and Corsica, the latter received by Montagne in 1820, thirteen years before it was published, and is labeled "Clathrus hirudinosus nobis"—Phallus subuculatus, type from Algeria, "very common and less fetid than impudicus," says the collector—Phallus duplicatus ex Ravenel—Phallus indusiatus, in alcohol, from French Guiana, also dried, the type of "Sophronia brasiliensis" from Brazil, also type of "Phallus radiciatus" from French Guiana, also from Tonkin and New Caledonia—Anthurus Calathiscus, no specimen was received, but the drawing is there from Perrottet, India, on which I think Montagne based his imaginary "Calathiscus Sepia."

UPSALA, SWEDEN.

In alcohol.—There is a very abundant collection made by E. Nyman in Java a number of years ago.

Phallus indusiatus, twelve collections, ten of the usual form with broad pilei and two with slender pilei.

Clautriavia merulina, two collections. This is a frequent species in Java.

Simblum periphragmoides (and the form gracilis), five collections, which convince me that gracilis is at the best a form of periphragmoides.

Mutinus bambusinus, one collection.

Clathrus Treubei, three collections, two old, with the arms broken apart, as shown in Myc. Notes, p. 382, fig. 212.

Jansia rugosa, one collection.

There is also at Upsala, in alcohol, a specimen of Aseroe rubra from New Zealand, collected by G. von Scheele; Clathrus cancellatus from Montpellier, France, and ten collections of Phallus impudicus by various collectors in Sweden.

Dried specimens.—Aseroe rubra from New Zealand, Berggren, and a drawing from the fresh specimens—Clathrus cancellatus, Tirol, Bresadola—Clathrus pusillus, "New Holland, ex. Berk."—Mutinus elegans from Curtis, and labeled "Corynites brevis," which was a manuscript name for it—Clathrus cibarius, New Zealand, Berggren—Lysurus Gardneri, co-types, ex. Berkeley—Macowanites agaricinus, co-type from Kalchbrenner. (Not usually classed in the phalloids, but to my mind closely related)—Mutinus caninus, ex. Quélet, France—Mutinus (unnamed), Guadeloupe, L'Herminier. (Something curious but unnamed, and I think this specimen unnamable)—Phallus impudicus Fautrey, France—Clathrus guttulatus, no specimen but the type drawing from Örsted on which the species was based.

BERLIN, GERMANY.

Dried Specimens: Clathrus cancellatus, from a hothouse at Berlin. It probably does not occur in the open as far north as Berlin. Three collections from southern Europe—Clathrus gracilis, three from Australia, also so-labeled from Samoa (!) and it seems correct.—Clathrus Baümeri, the types, dried specimens but better unnamed from such material.—Clathrus crispus, Guadeloupe —Simblum sphaerocephalum, three from Brazil and Uruguay—"Anthurus" Woodii, co-types and the type drawing. I think it is a Lysurus—Lysurus borealis var Klitzingii, same exactly I think as our American form—Aseroe (sp.?) from *Africa!*—Aseroe pallida, type and drawing from New Caledonia—Phallus indusiatus, specimens from Samoa, Usambara, New Guinea, Brazil and Australia—Phallus rubicundus, specimens from South Africa and Australia (labeled aurantiacus)—"Omphalophallus" calvescens and Muellerianus, both co-types (Australia) and both same, but specimens too poor for comment, much less to be named—Phallus (unnamed) from Brazil, on the order of Ravenelii but much too large—Mutinus caninus seven collections from Germany—Mutinus elegans from Rau, Penn.—Mutinus (sp.?) from Dr. Reinecke, Samoa. I found no Mutinus in Samoa.—Phallus impudicus, many specimens, mostly from Germany—Kalchbrennera corallocephala from MacOwan, South Africa, also a drawing (labeled Aseroe Tuckii and the type of this "new species")—Floccomutinus Zenkeri, the original drawing from Zenker.

In alcohol: Clautriavia merulina, Java—Simblum periphragmoides, Java—Phallus indusiatus, nine from Java, two from Africa, three from New Guinea. One of the African forms has unusually large meshes to the veil—Clathrus camerunensis, type, Africa—Clathrus Americanus (unnamed) from Paraguay—Clathrus chrysomycelinus, type Brazil—Laternea columnata, Brazil—"Laternea pentactina", type, Java. It is an old condition of Clathrus Treubei, the arms broken apart as shown in figure 212, page 382, Myc. Notes—Simblum sphaerocephalum, Brazil—Aseroe rubra, New Guinea. I can not say as to the exact form, but it seems to have a broad limb and to tend towards the East Indian species.—Lysurus borealis, var. Klitzingii, Berlin, same I think as our American form—Clautriavia Lauterbachii (type of Echinophallus Lauterbachii) unfortunately only known from eggs as it is a most peculiar genus—Eggs of a Clathrus determined as Preussii ? but I think the species is ?—Mutinus boninensis, type, all known, intermediate between Mutinus and Jansia—Jansia elegans, abundant, from Java, type of "Floccomutinus Nymanianus" but quite different from the genus Floccomutinus, I think.—Floccomutinus Zenkeri, type Africa, a very distinct genus, in my opinion—Mutinus bambusianus, several collections from Java. Some have rather short heads and in size approach Mutinus caninus of Europe. The gleba-bearing portions are more pointed and not so even as caninus—Mutinus caninus, Germany—Blumenavia rhacodes, type, Brazil—Itajahya galericulata, type Brazil.—Phallus glutinoides, type, Brazil. All are in egg state.—

Clathrus pseudocancellatus, type, Africa. It was probably originally in formalin as it is now flabby and shapeless.

Phalloids in alcohol in the show department of the Museum at Berlin: At Berlin there is the finest collection of phalloids, both as to numbers and condition, that exists anywhere. It was the work of the late Dr. Hennings, and the specimens are most beautifully prepared and displayed. The following is the list: Laternea columnata, Brazil—Clathrus cancellatus, Europe—Colus hirudinosus, Sardinia—Clathrus gracilis, Australia—Mutinus Moelleri, type, Brazil (=for me, bambusinus)—Floccomutinus Zenkeri, type, Africa—Jansia elegans (type of Floccomutinus Nymaniensis)—Phallus rubicundus, Africa (type of Phallus sanguineus)—Phallus tenuis, Java—Clautriavia Lauterbachii (type of Echinophallus)—Itajahya galericulata, type, Brazil—Phallus impudicus, two from Java, one Africa, also a slender form from Java (type of echinata)—Clautriavia merulina, two, Java—Lysurus borealis (var. Klitzingii)—Aseroe rubra, New Caledonia, also New Guinea—Blumenavia usambariensis, type, Africa—Clathrus Preussii, type, Africa—Simblum sphaerocephalum, Argentina—Simblum periphragmoides, Java—Mutinus caninus, Berlin—Mutinus Fleischeri, type, Java—Mutinus bambusinus, two, Java—Phallus celebicus, type, Celebes—Phallus impudicus, three, Berlin—Kalchbrennera corallocephala, South Africa (labeled Kalchbrenneri Tuckii var. clathroides, Henn.)—Clathrus camerunensis, type, Africa—Blumenavia rhacodes, type, Brazil.

THE LLOYD MUSEUM, CINCINNATI, OHIO.

Note.—As this list is made in England from the published records without having access to the specimens, some may have been overlooked. All listed are dried specimens unless otherwise noted.

Europe.

Clathrus cancellatus, Portugal, Rev. Torrend.
Clathrus cancellatus, Italy, M. Bezzi.
Clathrus cancellatus, France, L. Rolland.
Clathrus cancellatus, Spain, T. de Aranzadi.
Clathrus cancellatus, France, Auguste Bernin (fresh!) (alcohol).
Mutinus caninus, Ireland, Greenwood Pim.
Mutinus caninus, Germany, C. Engelke.
Mutinus caninus, Germany, Otto Jaap.
Mutinus caninus, France, C. G. Lloyd.
Mutinus caninus, Germany, W. Krieger, photograph.
Phallus imperialis, Italy, M. Bezzi.
Phallus impudicus, France, C. G. Lloyd.
Phallus impudicus, France, L. Rolland.
Phallus impudicus, Italy, M. Bezzi.
Lysurus borealis (red arms), England, Harold Murray, photograph.
Colus hirudinosus, Portugal, Rev. Torrend (alcohol).

United States.

Laternea columnata, Florida, L. N. Fowler (alcohol).
Laternea columnata, Florida, Dr. J. F. Maddox (alcohol).
Laternea columnata, Florida, C. E. Pleas.
Laternea columnata, Florida, C. G. Lloyd (alcohol).
Laternea columnata, Florida, C. E. Pleas (photograph).
Mutinus caninus, Canada, Jas. Fletcher.
Mutinus caninus, Maryland, W. T. Lakin.
Mutinus caninus, New Jersey, E. B. Sterling (alcohol).
Mutinus elegans, Ohio, Pennsylvania, and Kentucky, C. G. Lloyd (alcohol).
Mutinus elegans, Pennsylvania, Dr. Herbst (alcohol).
Mutinus elegans, Ohio, M. E. Hard (photograph).
Mutinus elegans, Connecticut, C. C. Hanmer (eggs).
Mutinus Ravenelii (?), New Jersey, E. B. Sterling.
Mutinus Ravenelii, Ohio, Chas. Dury (alcohol).

Mutinus Ravenelii (?), Florida, G. C. Fisher.
Mutinus Ravenelii, Ohio, A. P. Morgan.
Lysurus borealis, Ohio, H. C. Beardslee.
Lysurus borealis, Massachusetts, Geo. B. Fessenden.
Lysurus borealis, Connecticut, C. C. Hanmer (photograph).
Lysurus borealis, Massachusetts, Miss L. C. Allen.
Lysurus borealis (? red), Texas, W. H. Long, Jr.
Lysurus borealis, Massachusetts, G. E. Stone (alcohol).
Phallogaster saccatus, Ohio, C. G. Lloyd (alcohol).
Phallogaster saccatus, West Virginia, C. G. Lloyd.
Phallus duplicatus, Ohio, H. C. Beardslee (alcohol).
Phallus duplicatus, California, L. A. Greata.
Phallus duplicatus, Iowa, L. R. Waldron.
Phallus duplicatus, Ohio, C. G. Lloyd (alcohol).
Phallus duplicatus, Florida, G. C. Fisher.
Phallus duplicatus, Ohio, A. P. Morgan (alcohol).
Phallus duplicatus, Ohio, Prof. W. H. Aiken (alcohol).
Phallus imperialis, Colorado, E. B. Sterling.
Phallus imperialis, Texas, W. H. Long, Jr.
Phallus imperialis, California, L. G. Yates.
Phallus imperialis, Washington, D. C., F. J. Braendle.
Phallus imperialis, California, L. A. Greata.
Phallus imperialis, California, W. H. Henderson.
Phallus imperialis, Colorado, E. Bethel.
Phallus gracilis, Florida, L. N. Fowler (alcohol).
Phallus Ravenelii, Pennsylvania, Wm. Herbst (alcohol).
Phallus Ravenelii, Iowa, F. J. Fitzpatrick.
Phallus Ravenelii, Ohio, C. G. Lloyd.
Phallus Ravenelii, Ohio, Mrs. Carl Langenbeck (alcohol).
Phallus Ravenelii, Ohio, M. E. Hard (photograph).
Phallus Ravenelii, New Jersey, E. B. Sterling (fresh) (alcohol)
Phallus Ravenelii, Florida, G. C. Fisher.
Phallus rubicundus, Texas, W. H. Long, Jr.
Simblum sphaerocephalum, Nebraska, Rev. J. M. Bates.
Simblum sphaerocephalum, Texas, W. H. Long, Jr.
Simblum Texense, Texas, W. H. Long, Jr.

Brazil.

Itajahya galericulata, Rev. A. Schupp (photograph).
Clathrus chrysomycelinus, Rev. A. Schupp.
Clathrus Americanus, Rev. A. Schupp (dried).
Clathrus Americanus, Rev. A. Schupp (photograph).
Laternea rhacodes, Rev. A. Schupp.
Laternea rhacodes, Rev. A. Schupp (photograph).
Laternea (cfr. columnatus), Rev. J. Rick.
Laternea (unnamed?), Rev. J. Rick
Phallus (labeled rugulosus), Rev. J. Rick.
Simblum sphaerocephalum, Rev. J. Rick.

West Indies.

Clathrus crispus, Jamaica, Miss Barrett.
Clathrus crispus, Jamaica, Wm. Chadwick.
Clathrus (sp.?), Bahamas, L. J. K. Brace (egg).
Clathrus Americanus, L. J. K. Brace (formalin).
Laternea pusilla (?), Jamaica, W. Jekyll.
Phallus indusiatus, Jamaica, H. E. Cox.
Phallus indusiatus, Jamaica, Miss Barrett.
Simblum sphaerocephalum, Bahamas, L. J. K. Brace.

Samoa.

Phallus indusiatus, C. G. Lloyd (photograph and dried).

Hawaii.

Phallus rubicundus, D. D. Baldwin.
Phallus rubicundus (form gracilis), N. A. Cobb.

Australia and New Zealand.

Aseroe Hookeri, Miss Jessie Dunn.
Aseroe Muelleriana, A. G. Hamilton.
Anthurus aseroeformis, Prof. McAlpine (photograph and description).
Clathrus cibarius, Robert Brown.
Clathrus cibarius, Miss Jessie Dunn.
Clathrus cibarius, S. Duncan.
Clathrus cibarius, W. H. Laing.
Clathrus cibarius, Rev. J. Wilson.
Clathrus gracilis, Prof. D. McAlpine.
Clathrus gracilis, J. T. Paul.
Clathrus gracilis, F. M. Reader.
Clathrus gracilis, J. H. Spencer (alcohol).
Clathrus gracilis, Margaret Flockton (alcohol).
Clathrus gracilis, Edmund Jarvis.
Clathrus gracilis, J. G. O. Tepper.

Africa.

Kalchbrennera corallocephala, Cape, J. M. Wood.
Clathrus (undetermined), Dr. Labesse (alcohol).
Clathrus (unnamed), Congo, Edouard Luja.
Phallus indusiatus, Congo, Edouard Luja (dried).
Phallus indusiatus, Congo, Edouard Luja (photograph).
Phallus indusiatus, C. B. Ussher.
Unnamed genus, C. B. Ussher.

Mauritius.

Phallus gracilis, Chas. A. O'Connor (alcohol).
Phallus indusiatus, Chas. A. O'Connor (alcohol).
Phallus Mauritianus, Chas. A. O'Connor (alcohol).

India.

Genus unnamed, G. H. Krumbiegel.

Japan.

Phallus indusiatus, Professor Gono (drawing).
Phallus impudicus, Professor Kusano (drawing).
Phallus rugulosus, Professor Kusano (drawing).
Phallus rugulosus, Professor Kusano (alcohol).
Phallus rugulosus, T. Nishida (alcohol).
Phallus tenuis, Professor Kusano (drawing).
Phallus tenuis, Professor Kusano (alcohol).
Mutinus boninensis (?), Professor Kusano (alcohol).
Mutinus boninensis (?), Professor Kusano (alcohol).
Lysurus Mokusin, Professor Gono (drawing).
Lysurus Mokusin, Professor Kusano (drawing).
Laternea bicolumnata, Professor Kusano (photograph).

Java.

Clathrus Treubei, Dr. Ch. Bernard (photograph).
Clathrus Treubei, Dr. Ch. Bernard (alcohol).
Phallus indusiatus, Dr. Ch. Bernard (alcohol).
Clautriavia merulina, Professor Patouillard (photograph).
Clautriavia merulina, Dr. Ch. Bernard (alcohol).

Simblum gracile, Dr. Ch. Bernard (photograph).
Simblum gracile, Dr. Ch. Bernard (alcohol).
Jansia rugosa, Dr. Ch. Bernard (alcohol).
Aseroe arachnoidea, Dr. Ch. Bernard (alcohol).
Aseroe arachnoidea, Dr. J. P. Lotsy (alcohol).
Mutinus bambusinus, Dr. Ch. Bernard (alcohol).

APPENDIX V.

SOURCE OF ILLUSTRATIONS.

Photographs.

The best illustration of a phalloid is a good photograph, and we confidently look to photography to dispel much of the doubt that surrounds many of the species of foreign phalloids. We present herewith a list of those who have published or supplied photographs of phalloids or furnished material to illustrate phalloids by photography, and have indicated our figures that are taken from these sources. America leads the world in the use of photography to illustrate fungi. Well illustrated books have appeared by Atkinson, McIlvaine, Hard, and Marshall, all containing illustrations of phalloids. We have not cited them in detail, however, as they all cover the same restricted field of a few species. We think the following is otherwise a complete list of those who have aided in the work. We hope this pamphlet will awaken interest in the subject in other countries and that the next résumé of the subject will have a much larger list. If you find a phalloid that is not illustrated in this work by a good photograph, we hope you will not fail to secure a good photograph of it, if possible.

Dr. Chas. Bernard, Java.
Aseroe Zeylandica (Fig. 54.)
Clautriavia merulina
Jansia rugosa (Figs. 30 and 31).
Clathrus Treubei (Fig. 72).
Simblum gracile (Fig. 84).

Auguste Bernin, Monaco.
Clathrus cancellatus (Fig. 70).

N. A. Cobb, Hawaii.
Phallus gracilis (Fig. 6).

Robt. E. Fries.
Itajahya galericulata.

C. C. Hanmer, Connecticut.
Lysurus borealis (Fig. 41).

M. B. Hard, Ohio.
Phallus Ravenelii (Fig. 8).

W. Krieger, Germany.
Mutinus caninus (Fig. 23).

Professor Kusano, Japan.
Laternea bicolumnata (Fig. 64).

W. H. Long, Jr., Texas.
Phallus rubicundus (Fig. 5).
Simblum Texense (Fig. 85).
Simblum sphaerocephalum (Fig. 86).

D. McAlpine, Australia.
Anthurus aseroeformis (Fig. 46).

Alfred Moeller (from Brazil).
Phallus indusiatus.
Phallus Moelleri (Fig. 13).
Clathrus chrysomycelinus (Fig. 80).
Laternea columnata.
Laternea rhacodes.
Phallus glutinolens (Fig. 10).
Pseudocolus Garciae (Fig. 65).
Mutinus bambusinus (Fig. 26).
Itajahya galericulata (Fig. 22).

Harold Murray, England.
Lysurus borealis.

Chas. O'Connor, Mauritius.
Phallus Mauritianus (Fig. 17).

N. Patouillard, Paris
Clautriavia merulina.

Otto Penzig (from Java).
Aseroe arachnoidea (Figs. 55 and 56).
Phallus indusiatus.
Phallus favosus (Fig. 4).
Clautriavia merulina.
Phallus multicolor (Fig. 14).
Simblum gracile.
Jansia elegans (Figs. 32 and 33).
Jansia rugosa.
Mutinus Fleischeri (Fig. 27).
Pseudocolus Javanicus (Fig. 66).

T. Petch, Ceylon.

Jansia rugosa.
Phallus indusiatus.
Clautriavia merulina (Fig. 19).
Clathrus crispatus (Fig. 74a).
Clathrus delicatus (Fig. 82).
Simblum gracile.
Lysurus Gardneri (Fig. 38).

C. E. Pleas, Florida.

Phallus duplicatus (Fig. 16).
Laternea columnata (Figs. 57 and 58).

Carleton Rea, England.

Lysurus borealis (Fig. 40).

Rev. J. Rick, Brazil.

Laternea rhacodes (Fig. 61).
Simblum sphaerocephalum.

Rev. A. Schupp, Brazil.

Itajahya galericulata (Fig. 21).
Clathrus Americanus (Fig. 71).

Rev. J. Torrend, Portugal.

Colus hirudinosus (Figs. 89 and 90).
Simblum sphaerocephalum.

Photographed by the writer.

Phallus impudicus (France) (Fig. 1).
Phallus Ravenelii, Ohio (Fig. 7).
Phallus indusiatus, Samoa (Fig. 12).
Mutinus elegans, West Virginia (Fig. 24).
Mutinus Ravenelii, Ohio (Fig. 25).
Phallogaster saccatus, Ohio (Figs. 93 and 94).

Figures.

Next to a photograph, an accurate drawing is the best illustration. In a few instances we have used Penzig's figures in preference to his photographs. I think all figures are not good, especially the old ones reconstructed from dried specimens. However, as to many species they are all we have, and the following are the sources from which they have been reproduced. There are phalloids unillustrated by even a crude drawing. It is a standing reproach that authors are found to engage in such work. In a few such cases we have photographed the type as a makeshift illustration, but the most of such work we think is better considered as "nomina nuda" and relegated to "synonymy."

Fig. 2	Drawing by Otto Penzig.
Fig. 3	Drawing by Ed Fischer.
Fig. 9	Drawing by Ed. Fischer.
Fig. 11	Drawing by Alfred Moeller.
Fig. 15	Drawing by Rumphius.
Fig. 18	Drawing by M. C. Cooke.
Fig. 20	Drawing by Ed. Fischer.
Fig. 28	Drawing by F. M. Bailey.
Fig. 29	Photographed from the type.
Fig. 34	Drawing by F. M. Bailey.
Fig. 35	Drawing by Ed Fischer.
Fig. 36	Drawing by Ed Fischer.
Fig. 36a	Drawing by Zenker.
Fig. 37	Photograph from alc. material.
Fig. 38a	Photograph from dried type.
Fig. 39	Photograph from dried type.
Fig. 42	Drawing by Mueller.
Fig. 43	Drawing by Ed Fischer.
Fig. 44	Drawing by Montagne.
Fig. 45	Photographed from the type.
Fig. 47	Drawing by Kalchbrenner.
Fig. 48	Drawing by Berkeley.
Fig. 49	Sketch by Perrottet.
Fig. 50	Drawing by La Billardière.
Fig. 51	Drawing by Berkeley.
Fig. 52	Drawing by Berkeley.
Fig. 53	Drawing by Kalchbrenner.
Fig. 53a	Drawing by Le Rat.
Fig. 59	Drawing by Turpin.
Fig. 60	Photograph of the type.
Fig. 62	Drawing by Welwitsch.
Fig. 63	Drawing by Spegazzini.
Fig. 67	Drawing by Kurz.
Fig. 68	Drawing at Paris.
Fig. 69	Drawing by F. M. Bailey.
Fig. 73	Drawing by Berkeley.
Fig. 74	Drawing by Ed Fischer.
Fig. 75	Drawing by Oersted.
Fig. 76	Drawing by Turpin.
Fig. 77	Drawing by Dr. McCatty.
Fig. 78	Photograph, Museum at Kew.
Fig. 79	Photograph from alc. specimens.
Fig. 81	Drawing by Ed Fischer.
Fig. 83	Drawing by Hooker.
Fig. 87	Drawing by Ed Fischer.
Fig. 88	Drawing by J. W. Holland.
Fig. 91.	Drawing by Kalchbrenner.
Fig. 92.	Drawing by Kalchbrenner.
Fig. 95	Drawing by Kalchbrenner.
Fig. 96	Drawing by Berkeley.
Fig. 98	Drawing by Berkeley.
Fig. 99	Drawing by Hennings.
Fig. 100	Drawing by Montagne.
Fig. 102	Drawing by Berkeley.
Fig. 103	Drawing by Patouillard.
Fig. 104	Drawing by Patouillard.
Fig. 105	Drawing by Corda.
Fig. 106	Drawing by Kalchbrenner.
Fig. 107	Drawing by Spegazzini.

APPENDIX VI.

Reproduction of the original figures of doubtful and little known species of the genera Phallus and Mutinus. Most of them I think have no value whatever, but there is no way of getting rid of them.

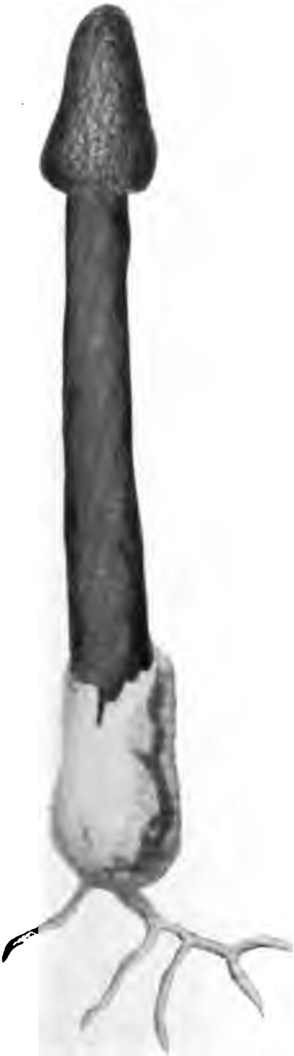


Fig. 95.

PHALLUS DISCOLOR.

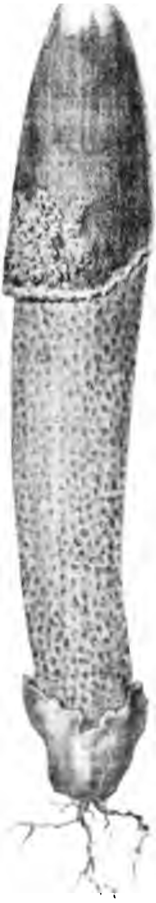


Fig. 99.

PHALLUS CELEBICUS.

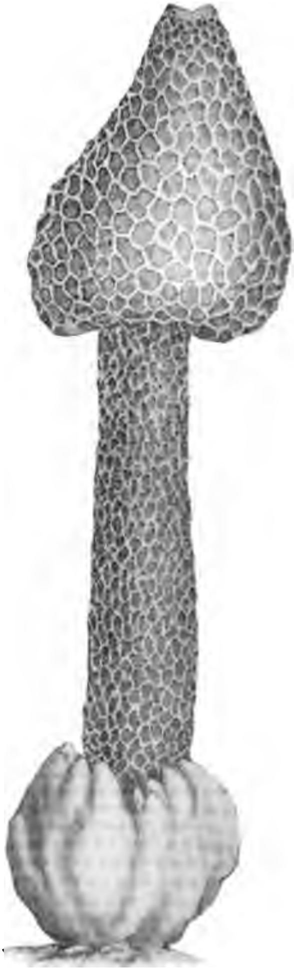


Fig. 102.

PHALLUS QUADRICOLOR.

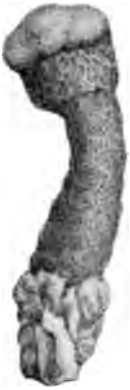


Fig. 96.

PHALLUS CALYPTRATUS.

Fig. 106

MUTINUS PAPUASIUS.

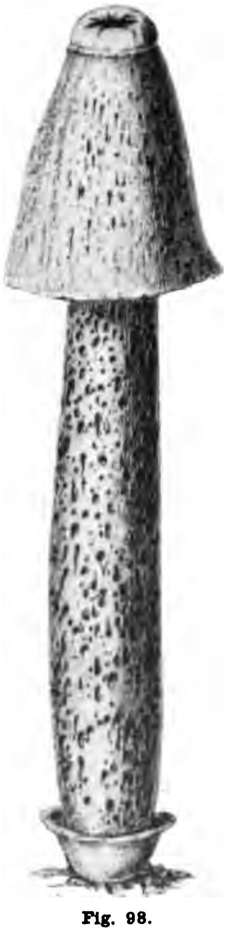


Fig. 98.

PHALLUS CAMPANULATUS.

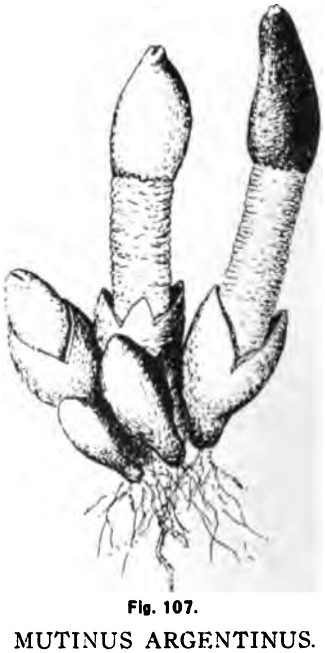


Fig. 107.

MUTINUS ARGENTINUS.

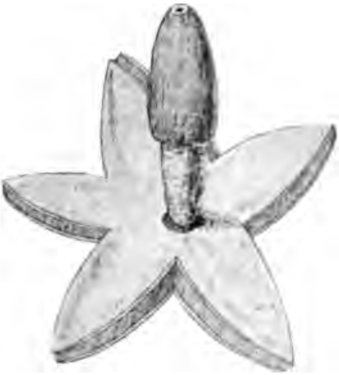


Fig. 105.

MUTINUS CURTUS.

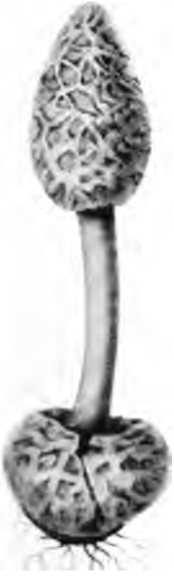


Fig. 100.

PHALLUS CANARIENSIS.

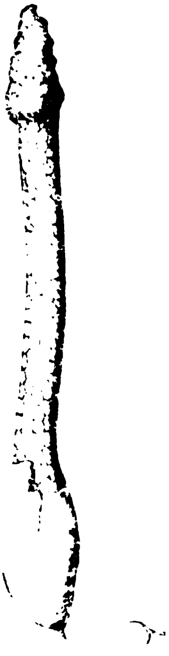


Fig. 103.

MUTINUS MINIMUS.

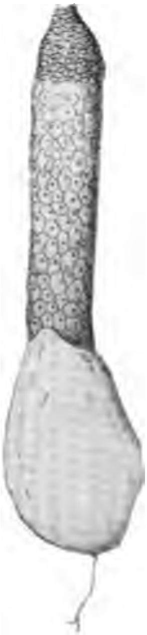


Fig. 104.

MUTINUS BORNEENSIS.

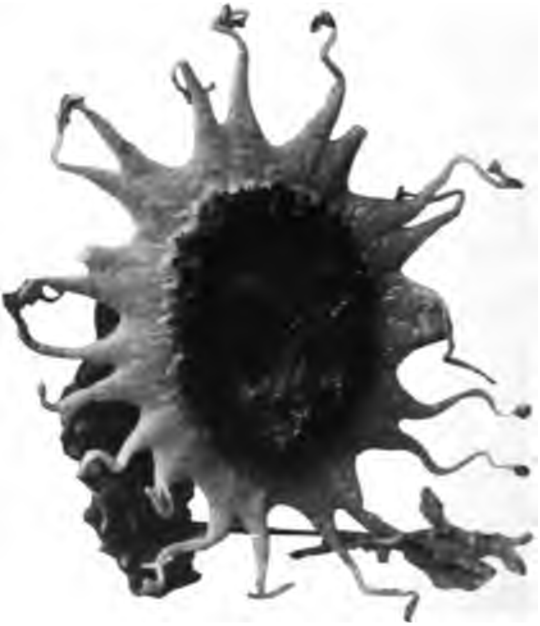
APPENDIX VII.

ASEROË RUBRA LA BILL. VAR. JUNGHUHNII SCHLECHT.

PAR DR. CH. BERNARD.

Avec deux photographies.

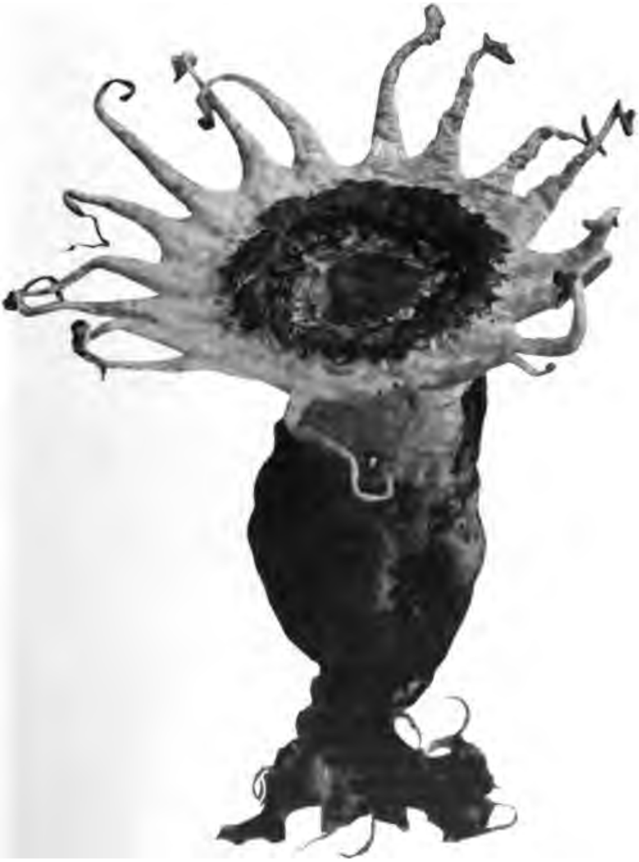
Il y a peu de temps, j'ai publié dans les Annales du Jardin botanique de Buitenzorg (Vol. XXII, 1908. 2ème partie, pp. 224-238), une petite note sur cette Phalloïdée très curieuse, assez rare, et jusqu'alors assez mal connue. Je déplorais à cette occasion de n'avoir pas pu faire une photographie convenable de ce type, et je signalais certains points dont l'étude demandait à être reprise ultérieurement. Depuis lors, j'obtins, toujours grâce à l'extrême amabilité de M. le Dr. *J. Bosscha,* plusieurs magnifiques exemplaires de cet organisme, et entre autres les deux individus dont M. ***Huysmans*** a bien voulu faire les deux photographies qui accompagnent cette note. Tous ces échantillons provenaient de la plantation de Taloen, sur le plateau de Pengalengan, au Sud de Bandoeng, c'est à dire de la même station où avaient été récoltés les exemplaires décrits dans ma précédente note. Ces nouveaux individus n'ont permis de faire certaines observations venant jeter quelque lumière sur des détails laissés jusqu' à présent dans l'ombre, et je ne crois pas inutile de publier ici ces quelques lignes qu' illustreront les deux photographies en question, et qui viendront fixer ou rectifier certains points d' importance secondaire, car je dois dire dès le début que, dans leurs caractères importants, ces individus coïncidaient très exactement avec ceux déjà observés.



Je disais entre autres: "*Aseroë rubra* est une espèce extrêmement poly-"morphe; . . . il est impossible de trouver dans la série de ses formes de "passage une solution de continuité permettant de séparer des espèces . . .

"et la forme qui nous occupe ici vient diminuer encore la valeur des variétés "nettement délimitées. . . . Il importe donc de ne séparer les types qu' avec "la plus grande prudence, car il est probable que pendant bien longtemps, "chaque fois qu' on découvrira un exemplaire de ces champignons éminemment "variables, ce nouvel individu constituera un anneau de cette longue chaîne de "types voisins, atténuant les différences et supprimant telle ou telle variété."

Les échantillons dont il sera question dans la présente note apporteront un argument de plus en faveur de cette opinion, et si, par certains de leurs caractères, ils se rapprochent des individus que j'ai décrits antérieurement, la disposition de leurs bras, qui est fort typique, établit un passage vers d'autres formes. Je me contenterai de donner une description de ces exemplaires, les points sur lesquels je veux fixer l'attention resortiront d'eux mêmes de la description et de l'examen des photographies.



Les deux échantillons que j'ai pu faire photographier n'étaient pas de dimensions particulièrement considérables, et le nombre des bras était de 18 chez l'un et de 22 chez l'autre, ce qui correspond aux indications que j'ai données antérieurement. De même l'extrémité plus ou moins régulièrement enroulée des bras est caractéristique. La disposition de la volve, du pied assez court, de la glèbe, les couleurs, l'odeur, etc., ne distinguaient en rien ces formes de celles déjà décrites. Pour tous ces détails je renvoie donc à ma précédente publication. Mais le point important et sur lequel je tiens à insister est le suivant: tandis que les exemplaires que j'ai observés jusqu' ici établissaient un passage entre les var, *zeylanica* et *Junghuhnii* de *Aseroë rubra,*—certains de leurs caractères, comme je l'ai démontré p. 235, rappelant ceux de l'une ou de l'autre de ces deux variétés,—les types dont nous nous occupons aujourd'hui et surtout l'un d'entre eux sont beaucoup plus voisins de la variété *Junghuhnii;* et même par la plupart de leurs détails, ils coïncident presque exactement avec cette variété comme nous la trouvons décrite d'ordinaire; cependant en comparant tous mes échantillons, j'ai pu me convaincre qu'il n'y a nulle raison de séparer les unes des autres ces différentes formes qui toutes du reste proviennent d'une seule et unique localité; elles appartiennent non seulement à la même espèce, mais aussi à la même variété, cela ne fait aucun doute et il me semble que la question que se posait *E. Fischer* dans le "Sylloge Fungorum," Vol. VII, p. 25, quand il se demandait à propos de *A. Junghuhnii:* "An ab *A. zeylanica* diversa?" doit être certainement résolue par le négative. Non seulement il ne saurait s'agir de deux espèces différentes, mais encore il me parait sue les deux types doivent être rangés sous un même nom de variété.

Le caractère important auquel je fais allusion est la disposition des bras; je disais à ce propos: "Les bras étant séparés les uns des autres et le disque, "dans certains échantillons étant très peu développé, cela parle en faveur d'une "identité avec *A. zeylanica.* Cependant il faut remarquer que le disque peut "être remarquablement développé (caractère de *A. Junghuhnii*) puis que, si "les bras sont le plus souvent nettement séparés les uns des autres jusqu' à leur "base, il existe cependant des cas, assez rares, où l'on pourrait croire à de vagues "indications de rapprochements par paires." Dans les formes qui nous occupent, il ne s'agit plus de vagues indications. Un des deux individus photographiés n'est pas encore très convaincant à cet egard, il est cependant facile de reconnaître que ses 18 bras sont rapprochés par paires les uns des autres. Mais l'autre individu est des plus typiques, et ses 22 bras sont très nettement et très régulièrement rapprochés deux par deux les uns des autres. Dans les deux échantillons le disque est assez fortement développé.

Pour terminer je crois qu' il m'est permis de maintenir, en la renforçant, la conclusion que j'énonçais à la fin de mon précédent travail, mais que je n'osais encore affirmer, à savoir que les variétés *zeylanica* et *Junghuhnii* d' *Aseroë rubra* devront être réunies dans la suite sous un même nom.

Cette petite note n'a pas d' autre prétention que de présenter deux individus de cet intéressant champignon qui, s'il a été souvent décrit, et plusieurs fois dessiné, n'avait pas encore, que je sache, été photographié jusqu' ici.

Les deux photographies reproduisent le champignon à peu près en grandeur naturelle.

EDITOR'S NOTE.

We publish the above article by Dr. Chas. Bernard, and we take no editorial liberties with it, but publish it just as received. We are particularly glad to get the photograph, which is the first published of this species of the East Indies. As we have stated in detail on page 44 our views as to the species of Aseroe, we shall not discuss the matter here. We believe, however, that the Ceylonese plant, Aseroe Zeylandica, and the Javanese plant, Aseroe Junghuhnii, are one and the same but quite distinct from the New Zealand and Australian forms which go to make up Aseroe rubra.—C. G. L.

THE LLOYD LIBRARY, CINCINNATI, O.

Devoted exclusively to a library of Botany and Pharmacy. It contains at the present time about twenty-five thousand volumes on the above named subjects.

INDEX.

In making up the pages it was not practicable to keep the figures in serial order nor always in close relationship to the corresponding text. In this index we have given the page on which will be found the text and also the figure for each species.

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J. U. & C. G. LLOYD
CINCINNATI, OHIO

MYCOLOGICAL SERIES, No. 5

Synopsis of the Genus Hexagona

By C. G. LLOYD

P. HARIOT.

To Monsieur P. Hariot, Curator of the Cryptogamic Museum at Paris, France, I beg to dedicate this pamphlet, in recognition of the many courtesies extended to me while working in the Museum.—C. G. Lloyd.

THE GENUS HEXAGONA.

Definition.—The genus Hexagona can be described in a few words as being fungi with large, round or hexagonal pores, or Polyporus with large, round or hexagonal pores. It is a tropical or sub-tropical genus, and does not occur in temperate regions. Theoretically the genus is purely artificial, based on a single character, but it is a very convenient genus, and to attempt to break it up would only make a needless complication.[1]

In context Hexagonas are usually corky-woody, and as Fries knew only such species, he specified this as a character of the genus. There are a few species with hexagonal pores of which the context is rather fleshy-cartilaginous. We should include them also in Hexagona, believing it to be better to take the genus literally on its pore character.

Size of the pores.—While the basic idea of the genus is *large,* round or hexagonal pores, the word large is, of course, only relative. There has been associated (unintentionally perhaps) with the genus Hexagona the idea of regularity of pores. Thus there is a series of forms related to Hexagona tenuis which have by common consent always been classed in Hexagona. The pores are rather small, but they are *regular* and *shallow.* Many other polyporoids with larger pores are classed with Polyporus or Trametes when the pores are deep.

There is also a group of species, such as Polystictus pinsitus, with equally as large and as shallow pores, but they are irregular, with thin, angular, uneven pore-walls. This section is generally included in Polystictus, and I think that is preferable, but sometimes species of this section have been called Hexagona.

Spores.—The color of the spores was not taken into account by the old authors in the genus Hexagona, but as they are practically all supposed to have white spores, we should make that a character also of the genus. We have never seen a single spore of any species of what we include in Hexagona, as spores of white-spored polyporoids are *rarely found* in herbarium specimens. But the fact that we do not find the spores is a strong evidence that they are white.[2]

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[1] Any one who is so disposed, however, can discover as many and as useless "new genera" in it as have several times been discovered in Polyporus.

[2] It is well known that species of polyporoids with colored spores have the spores usually (if not always) in abundance. I have no doubt that all Hexagonas have white spores, though I have not positive evidence of the fact in a single instance.

There are but two cases where plants have been classed as Hexagona which I have found to have colored spores, viz.: Hexagona decipiens, of Australia, and Hexagona gracilis, of Brazil. I shall exclude them both, however, from Hexagona and include them in the section of Polyporus, where they belong, not only on their spore color, but their general natures, which are closer to other Polyporus than to Hexagona.

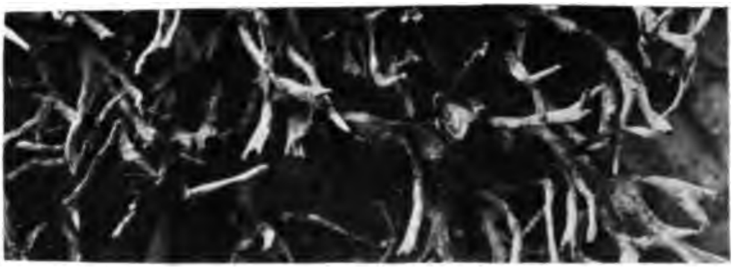

Fig. 276 X 6

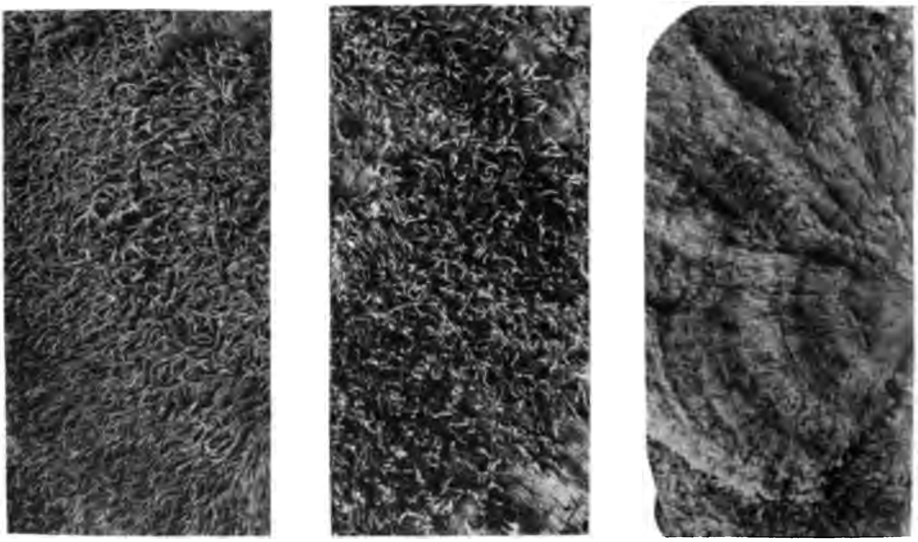

Fig. 277.

Surface markings.—The next character that we use in grouping the species is the nature of the surface.

Setosus.—There is a very marked section of Hexagona with dense, coarse, rigid, black hairs or setae on the surface. This is the same character that is so familiar in the common Trametes hydnoides of the tropics. In fact, there is a series of species beginning with Trametes hydnoides with minute pores and ending with Hexagona apiaria with the large pores. This series has the same form, context, color, peculiar surface hairs, and differs chiefly in the size of the pores. It is a very natural group and might well be discovered to be a new genus. The hairs (Fig. 276 X6) are peculiar, being more or less wedgeshaped and incised. They are detersive and fall away from old specimens.[3] Our figure (277) shows the same species (of Australia) in three different conditions. But there are species that we include in this section in which these hairs are not so strongly developed. Hexagona Deschampsii (Fig. 282) has the hairs or fibrils strongly agglutinate with only a few free fibrils. It resembles old, worn conditions of the previous species. And finally we include in this section species strongly marked with entirely agglutinate fibrils as Hexagona elegans (Fig. 284).

Velutinus.—This section includes species with fine, soft, velutinate hairs (Fig. 289). It embraces but a few species.

Glaber.—Surface smooth, but often zoned or uneven, but not hirsute, velutinate or with strongly agglutinate fibrils.

General shape.—There are of course intermediate specimens, but most species can be arranged in one of three sections according to their general shape. All Hexagonas are sessile without stems,[4] or (as in albida) sometimes a rudimentary-lateral stem.

Ungulaformis.—This section, which comprises but a very few species, has the pileus thick with deep pores. It is usually hard and sub-woody and corresponds to the genus Fomes, though the pores are never stratified.

Applanatus.—The texture is softer and general shape is flatter than in the previous section. The shape corresponds to the usual shape of Fomes applanatus. Usually it is a centimeter or more thick. We include in this section also some species such as Kurzii that are thinner and tend toward the next section but have deeper pores, 5 mm. or more.

Tenuis.—The character of the section tenuis is the very *thin* pileus, rarely over two or three mm. thick, and the small (for Hexagona) shallow, regular pores.

The setae in the pores.—There are some species of Hexagona that have conspicuous, colored setae in the pores. Sometimes these setae are large enough to be seen with the naked eye, and can easily be noted on the accompanying figure (278), which is enlarged six diameters. These setae are always in connection with ferruginous or cinnamon context. They are much larger than the microscopic setae found on many polyporoids, (Cfr. Pol. Issue, page 2), and often called cystidia. Klotzsch noticed these setae and proposed a new tribe, Scenidium, but the idea never found favor. The inner surface of the

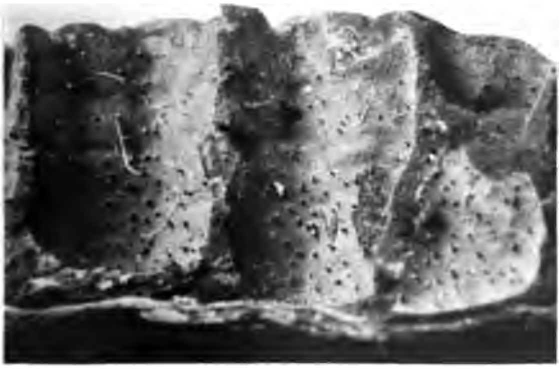

Fig. 278 (X 6).

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[3] Mr. Murrill states that the plants are "nearly glabrous when young" and are finally clothed with these hairs. I think his explanation should be taken backwards.

[4] This statement excludes Hexagona gracilis, which, however, is not a Hexagona for me.

pores of Hexagona leprosa appears finely pubescent, but under the lens the hairs are sub-hyaline and are of quite different nature from the colored setae of other species.

Color of context.—Most species have a colored context. It is hard for me to designate the exact color, though it is customary to describe it as cinnamon, ferruginous, gilvous, etc. In this pamphlet I designate these as having "colored context." A fewer number have a context color white or pale ochraceous, much paler than the former. We indicate these as "pale context." The difference between these two context colors is so marked that the character can be used to advantage in classification, and we base on it one of our groups.

The glaucescence of pores.—Many collections of Hexagona have pores strongly silvery glaucous, and it is a puzzling question how much stress to place on it in classification. In itself, I think it is not of much value, for many collections show some specimens glaucous and others not or only partially so. It seems to me to be a sort of deposit on the pores, with age perhaps. At Kew there is a specimen of Hexagona apiaria where most of the pores are strongly glaucous and the outer (younger) ones not at all. It is one of the species that has setae on the pores. The setae are quite noticeable on the non-glaucous pores, but in the glaucous ones they are not visible and have been covered up (apparently) with this deposit.

History of the genus.—In the very old days all fungi that had pores were called Boletus, and under this name are included in Linnaeus' Species Plantarum. Palisot-de-Beauvois, who was a collector of African plants, included a few fungi in his plates, and the Polypores he divided into two genera, those with large, round, hexagonal, or elongated pores, that he called Favolus, and those with small, round pores that he called Microporus. Fries divided Palisot's first genus into two, those with hexagonal pores which he called Hexagona, and those with elongated pores that he called Favolus. He took the name Hexagona from a probably inaccurate illustration of Pollini, which however showed hexagonal pores, and the genus was based on this one character. It has been taken in this sense by mycologists for about eighty years and about a hundred alleged new species have been named in accordance. The early mycologists, Persoon, Klotzsch, and Berkeley, were at first not disposed to consider a "large pored" genus of much value, but after the appearance of Fries' Epicrisis (1838), where he collated all the known species, no one has presumed to deny the genus.[5] The first species to reach Europe was undoubtedly sent to Linnaeus, who named it Boletus favus. It was from China, but is not in the Linnaean herbarium, but was stated by Klotzsch, Berkeley, and Hariot to be the same as Hexagona Wightii, which it probably is.[6] The next were two species from Africa, beautifully illustrated by Palisot-de-Beauvois, and the specimens (one at least) are now in the Delessert Herbarium at Geneva.[7] Next, Hexagona tenuis, the most common species of the tropics was named by Hooker from South America. The specimen is in fair condition in Hooker's herbarium at Kew. Then Persoon published Hexagona apiaria and Hexagona vespacea from the island of Rawak, and both are in good condition at Paris, the latter rather scanty however. When Fries issued his Epicrisis (1838) twelve species were supposed to be known and Fries had overlooked one of Palisot's.[8] Since the Epicrisis there has been a steady output of "new species." There are in my index 125 names of supposed species, but this includes a few that were not called Hexagona but which in my opinion should have been, and a larger number that were called Hexagona and should not have been.

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[5] Recently a little cheap juggling was attempted to change all Hexagonas to Favolus and all Favolus to Hexagona, thus making new combinations for them all, and a muss in general. It was based on such a flimsy pretext that it is not worth discussing in detail. Monsieur Hariot, who first showed how the trick could be turned (Bull. Soc. Myc. de France, 1891, p. 203), dismissed it with the very sensible remark: "Mais la tradition Friesenne s'est imposée et il serait difficile dans l'etat actuel de la science d'intervertir les désignations génériques de plus d'une centaine d'espèces. Le remède deviendrait pire que le mal et force est de s'en tenir aux idées admises."

[6] How this was overlooked in the priority hunt I do not know. 1753 is such a "prior" date to arrange alleged synonyms that a good thing like that ought not to be overlooked.

The work in this pamphlet.—In my work with the polyporoids I have visited and studied and photographed the species of Hexagona in the following museums: Kew London, British Museum London, Leiden, Berlin, Upsala, and Paris, and the private herbarium of Monsieur Patouillard at Paris. Most of the historic material is preserved in these museums and of the 125 species named in my index I have seen the type (or in a few cases the co-type) of all that exist but eight.

Classification.—For convenience we arrange the species in sections or groups. We have tried to make these groups as natural as possible for the benefit of the future "new genus" discoverers.

First (Setosus).—Typically the surface is clothed with dense, coarse, branched, rigid hairs, usually detersive and then the surface is fibrillose. We include also species which are covered with agglutinate fibrils generally with free ends.

Second (Velutinus).—Surface covered with fine, soft pubescence, or velutinate hairs. Plants that we include here are all thin and as to shape belong in section 5 (Tenuis). A few species that are pubescent we arrange on general relations in other groups, viz.: Pobeguini in Applanatus; macrotrema in Pallidus; bipindiensis in Pseudofavolus.

Third (Ungulaformis).—Thick, hard, with long pores and generally hoof-shaped. This section corresponds to the woody (Fomes) section of Trametes and might be called Hexagona-Fomes. We include here also Hexagona resinosus on its general nature, although it has a pale context and might be placed in the group Pallidus.

Fourth (Applanatus).—General shape applanate or flattened as distinguished from Ungulaform or hoof-shaped. Plants of this section are of a softer nature than the previous section. We include here for this reason Hexagona amplexens, that from its shape alone should be included in the preceding, and for a similar reason we include in the preceding resinosa which from its shape alone belongs in this section.

Fifth (Tenuis).—Pileus very thin, rarely two or three mm. thick with small (for Hexagona) regular, shallow pores. Surface smooth. We include in Velutinus species with pubescent surface.

Sixth (Pallidus).—Context white or pale ochraceous. (All the preceding except resinosus have context that is more deeply colored, ferruginous, cinnamon, etc.)

Seventh (Pseudofavolus).—All the previous have context suberose or subligneous. In this section we include the species with fleshy, tough nature. Usually they have been classified with the genus Favolus from which they differ essentially in their pore shapes. Patouillard bases on them a genus (Pseudofavolus). In our opinion, they should be included in Hexagona.

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[7] I have never seen these, but Palisot gave such fine illustrations that it is not necessary to see them. One can be as sure from such illustrations as from the specimen itself.

[8] Viz: Hexagona glabra. As Saccardo seems to have started his compilation of the polyporoids with Fries's Epicrisis, this species does not occur and has been lost to all modern books.

Eighth (Resupinatus).—I think no resupinate species occur, but the section is convenient for a resupinate "species" so claimed.

GROUP 1, SETOSUS.

HEXAGONA APIARIA (Fig. 279).—Color dark. Surface densely covered with coarse, branched, dark hairs which are detersive, and old specimens have the surface coarsely fibrillose. Pores large (3-4 to cm.) from 5-10 mm. deep, ferruginous, often glaucous *with prominent setae* (cfr. page 3, fig. 278 x6.) Context thin, ferruginous.

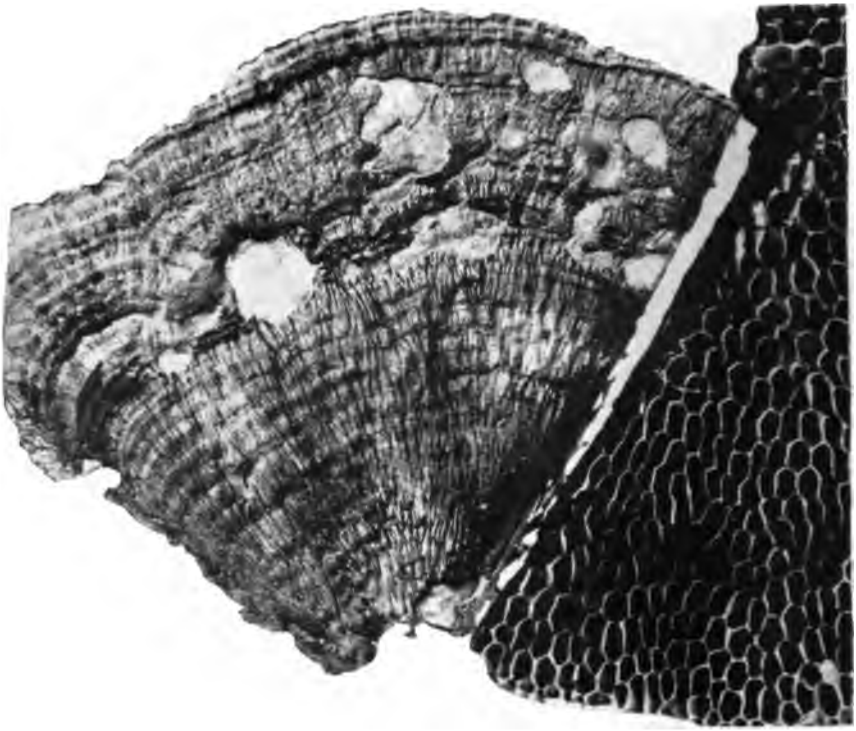

Fig. 279

Hexagona apiaria. Type at Paris.

History.—A frequent plant in the Philippines, India, Ceylon, and Australia, and as found in the museums usually called Hexagona Wightii. At Berlin there is a specimen from New Guinea and one from Guadeloupe.[9] Linnaeus named something (none knew what) Boletus favus which came from China, and was evidently a Hexagona and probably this plant.[10] The first specimen known to reach Europe was from Rawak and was named Polyporus[11] apiarius by Persoon and a good figure given. The specimen (Fig. 279) is in good condition at Paris. Next Klotzsch got a specimen from Wight, India, which he called Polyporus Wightii, and also gave a good figure of it.[12] He noticed the setae (See fig. 278, page 3) in the tubes, which are evident even to the naked eye, and gave an exaggerated figure of them and based on them a "new tribe." Scenidium.[13] A number of specimens have since reached Europe and are usually referred to Wightii. At the time he described the plant Klotzsch published that it was the same as Boletus favus of Linnaeus, and that was also Berkeley's opinion, and I think was probably true.[14]

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[9] This is the only specimen from an American station, but the plant is not included in N. A. F., which professes to include all West Indian species. Owing to the superficial work done by the author in the museums of Europe, he probably never saw the specimen.

[10] The specimen does not exist in the Linnaean herbarium, though there is in the herbarium a specimen of Hexagona tenuis named "Boletus favus, Linn." by Dickson, many years after Linnaeus died.

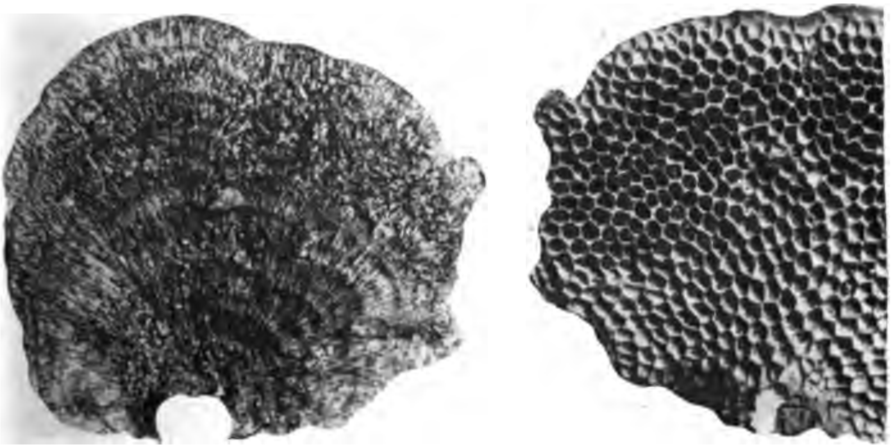

Fig. 280

Hexagona hirta.

HEXAGONA HIRTA (Fig. 280).—Color dark. Surface covered with a dense coat of rigid, branched, dark hairs. These are often detersive. Context dark, ferruginous. Pores medium (about 8 to 10 to cm.) about 5 cm. deep. Owing to the depth and relatively small size of the pores it is often put in Trametes, and it belongs there about as well as in Hexagona.

History.—It seems to be a common plant in Africa, but only in Africa as far as I know. It was most beautifully and accurately illustrated by Palisot-de-Beauvois more than a hundred years ago (1805) and his specimen is at Geneva. Notwithstanding it frequently reaches Europe, but one single specimen has ever been referred to Palisot's name. Fries discovered it was a new species and called it Hexagona crinigera. Klotzsch got it from Mauritius and referred it to Linnaeus' (alleged) species under a Friesian name-change, Hexagona sinensis. Berkeley decided it was not the Linnaean species and changed it to Trametes Klotzschii. (He was only guessing, but probably guessed right.) I think this name has been most generally used for it. Then Léveillé got a specimen from Madagascar, and found it to be another new species, Trametes crassa. Then Cooke got the *same collection* (Perville, Madagascar) and described it as Trametes adelphica, but he does not seem to have taken himself very seriously, for he never changed his manuscript name on his specimens and they are found to-day in his collection as Hexagona strigosa.

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[11] Persoon at the time was aware of the genus Hexagona, but declined to consider it a genus, stating that the size of pores is only a relative character.

[12] I think the type does not exist. The only specimen I have seen from India is at the British Museum, but was not collected by Wight.

[13] Under these conditions it seems to me very careless, to say the least, for Mr. Murrill to describe the pores of Hexagona Wightii as "glabrous within."

[14] Klotzsch does not seem to have been consistent in his views of "Boletus favus, Linn." He gives this plant as being the same, and then he refers another plant to Hexagona sinensis, which was only a name-change of "Boletus favus."

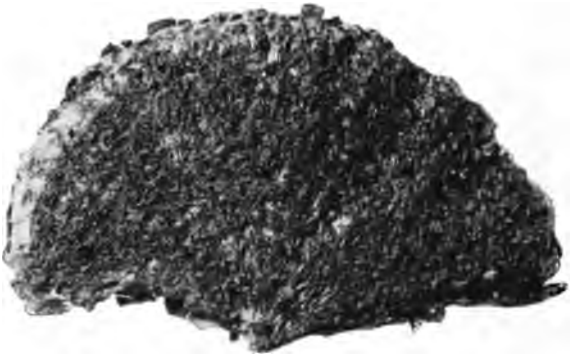

Fig. 281
Hexagona capillacea.

HEXAGONA CAPILLACEA (Fig. 281.)—Color light, ferruginous or cinnamon, covered with a dense coat of concolorous hairs. Pores large, 3-4 mm. deep, with thin, flaccid walls. Bright ferruginous in color, devoid of setae.

History.—This is known from a single specimen (Fig. 281) from Venezuela, South America, now in the herbarium of Patouillard. From the figure it is evidently close to apiaria, but is lighter color, has finer hairs and thinner, more flaccid pore-walls.

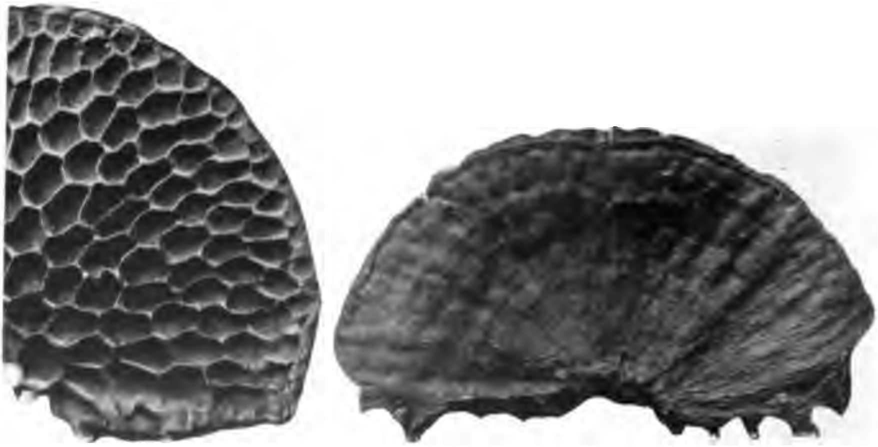

Fig. 282

Hexagona Deschampsii.

HEXAGONA DESCHAMPSII (Fig. 282.)—Pileus dark reddish brown, with adpressed fibrils, a few with free ends. Context thin, ferruginous. Pores large, 3 to cm., rather shallow (3-4 mm. deep) bright, ferruginous (never glaucous) and with prominent setae.

This species is quite similar to apiaria but is smaller, thinner, and never has the dense coat of rigid hairs characteristic of apiaria in its prime. It is only known from Ceylon. Abundant specimens reached Berkeley and were by him referred to crinigera of Africa (from which it is quite different). Then a single specimen, having strayed into Paris, was named Hexagona Deschampsii.

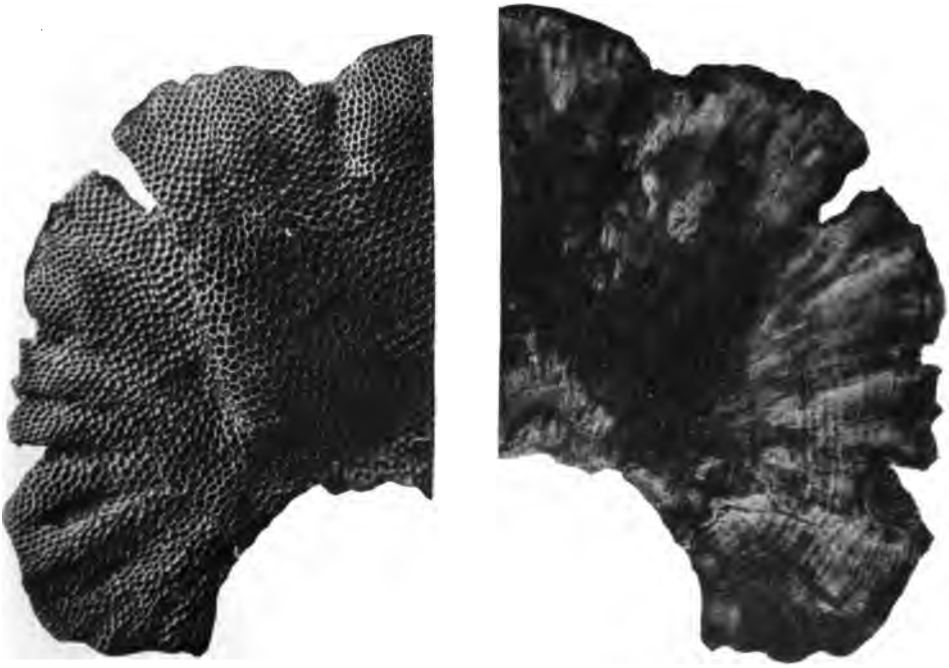

Fig. 283

Hexagona aculeata. Type at Paris.

HEXAGONA ACULEATA (Fig. 283).—Color reddish brown, with appressed, fibrillose, zonate surface. Pileus thin. Pores medium, 5-6 to cm., regular. Color ferruginous.

This is known only from one collection made in French Guiana by Leprieur. It is in Montagne's herbarium, and there is also a co-type at Upsala. It has about the same sized pores as Hexagona hirta, but is a lighter colored plant, is thinner, and does not have the same dense coat of hairs.

HEXAGONA ELEGANS (Fig. 284).—Color dark, reddish brown. Surface with appressed, rigid fibrils and zonate. Pores medium, 5-6 to cm., 6-8 mm. deep, glaucous.

A single specimen of this is in the museum at Paris and its origin is not known. It is not as close to Hexagona aculeata as might appear from the photograph. It is a thicker plant and the pores are glaucous, also the surface is not so strongly zoned.

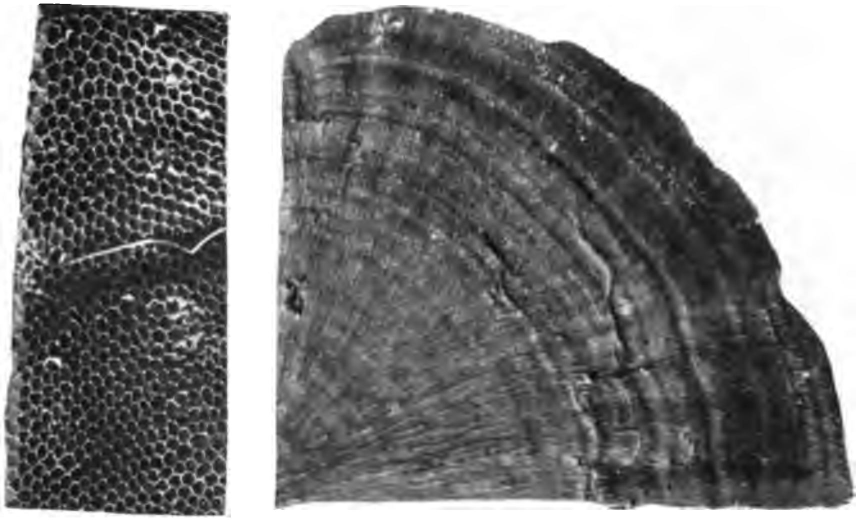

Fig 284

Hexagona elegans. Type at Paris.

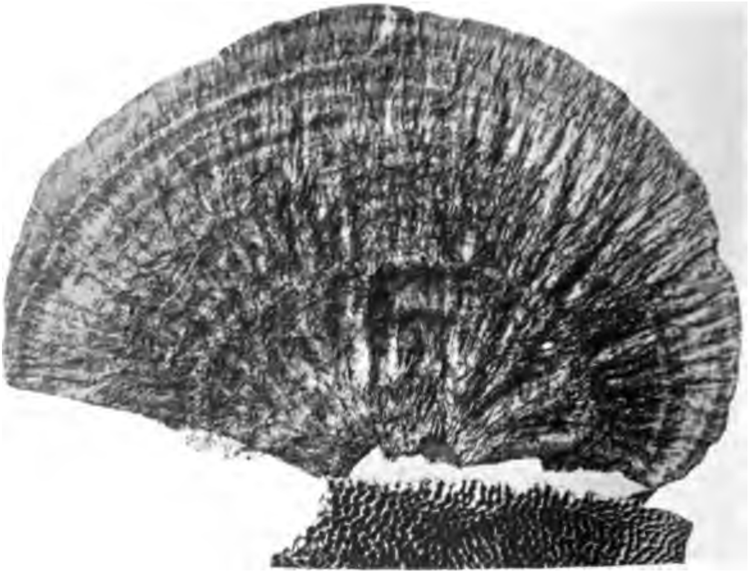

Fig. 285

Hexagona Dybowski. Type at Paris.

HEXAGONA DYBOWSKI (Fig. 285).—Pileus *thin, flexible*, of a *pale* color. Surface rugulose, zoned with a dense coat of pale, slender hairs, which are detersive, and old specimens evidently become almost smooth. Pores medium, pale, with angular walls disposed to become somewhat irpicoid.

There are three collections of this plant from the Congo, Africa, in the Museum at Paris, but it has never reached any other museum. It is a unique species, very different from all others of this section in its pale context color and the general color of the plant. Its affinities are rather with Trametes or Polystictus than with Hexagona.

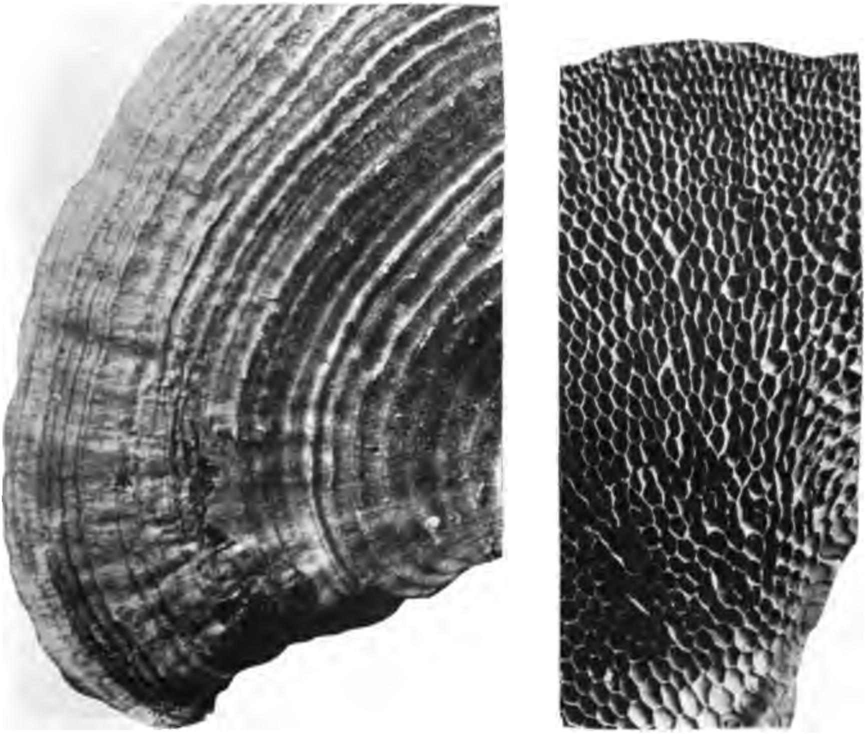

Fig. 286

Hexagona Henschalli. Type at Kew.

HEXAGONA HENSCHALLI (Fig. 286).—Color reddish brown. Pileus thin, strongly zoned. Most of the zones are smooth or appressed fibrillose, a few with free fibrils. Pores large, rather shallow, glaucous, with thin walls and disposed to become a little irpicoid.

A single specimen is at Kew from Java, and named Hexagona Henschalli by Berkeley. It was never published, but was placed in the apiaria cover from which species it seems to me to be quite different.

GROUP 2, VELUTINUS.

We include in this group only the thin, velutinate plants that correspond to the group Tenuis in form and thickness. There are three other pubescent or velutinate plants (mentioned on page 14) which are included in other groups. As included here, the entire group might be considered a single species. All are very similar plants, thin with zonate, velutinate surface, and small, regular, shallow pores. It is chiefly an American group and abundant specimens are in the museums from the West Indies, Mexico, and South America. Of other than American specimens there are only three collections known, viz.: one each from New Caledonia, Africa, and Ceylon.

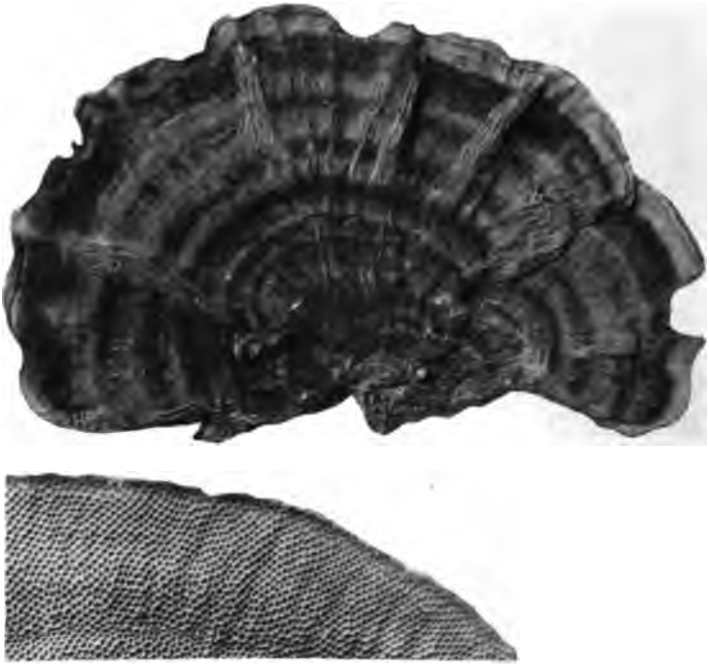

Fig. 287.

Hexagona variegata.

HEXAGONA VARIEGATA (Fig. 287).—Pileus thin, with ferruginous context. Surface velutinate with fine hairs and strongly marked with variegated, colored zones. Pores small, regular, shallow, smooth, usually ferruginous color, but sometimes glaucous.

This is a strongly marked species, the upper surface resembling bright forms of Polystictus versicolor. The contrast of zones usually alternate seal brown and blood brown. Sometimes plants are more evenly colored and then it runs into the next "species." It is a common plant in Mexico, Central America, West Indies, and South America, and many specimens are in the museums. Most of them are called variegata, and Berkeley so labeled most of his specimens. There is no question, however, that it is the same plant that Berkeley at a much earlier date named Hexagona papyracea and as he himself virtually so stated. The name variegata is a much better name and has been generally employed.[15]

The two following may be called varieties or species, as you may prefer.

HEXAGONA SCUTIGERA (Fig. 288).—In Balansa's exsiccatae are found specimens so labeled on Spegazzini's authority. It is practically the same as the preceding except the surface is of a uniformly brownish color and is perhaps more rugulosely zoned. In any large collection of Hexagona variegata, however, all connecting forms occur, and it is at best a form. No type exists, but I judge it is correctly named, in which event it is a case for the date dictionary experts.

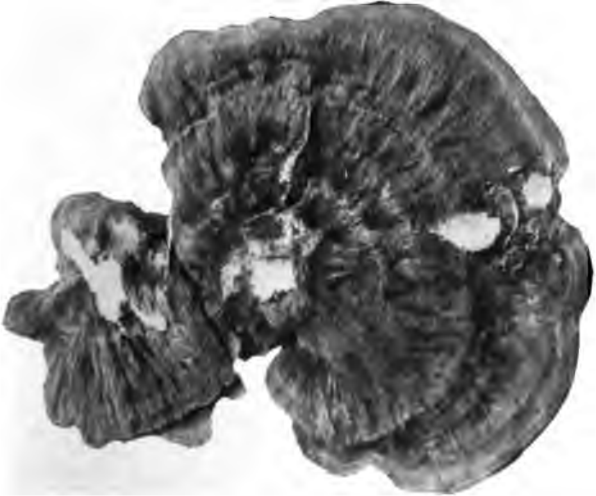

Fig. 288
Hexagona scutigera.

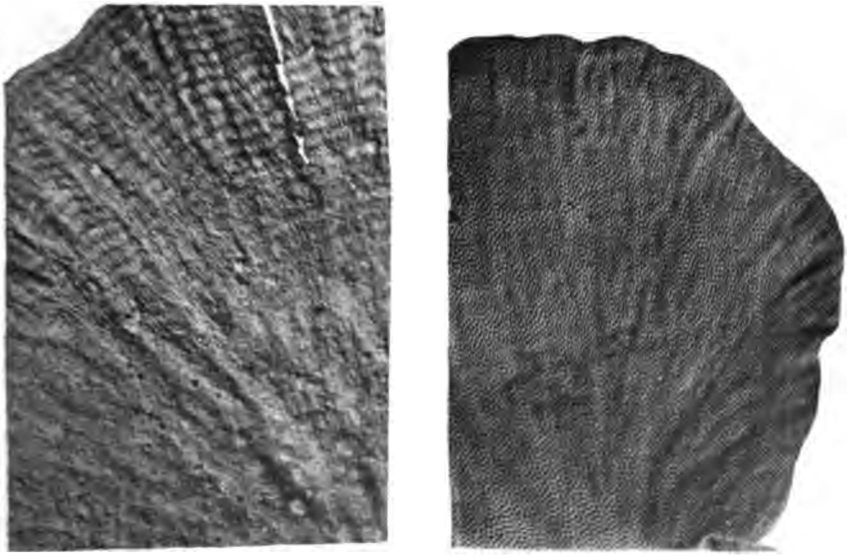

Fig. 289
Hexagona velutina. Type at Paris.

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[15] Even Mr. Murrill uses it, though in order to excuse his disregard of dates he puts a question mark after Hexagona papyracea. If any doubtful mark should be used, it should be after variegata, for the type specimen of Hexagona papyracea is in good condition and unquestioned, and there is no type of Hexagona variegata so labeled. As a matter of fact I believe there is a "type" from which variegata was named, but *it is labeled Hexagona papyracea.*

HEXAGONA VELUTINA (Fig. 289).—The only specimen of this section known from Africa has a uniform brown color with narrow zones. It also has smaller pores. Otherwise it is the same as variegata. It is known from a single specimen and was called velutina. Nearly the same plant (one collection) reached Berkeley from Ceylon. He referred it to variegata.

Note.—The following species with pubescent pilei are placed in other sections: Pobeguini in Applanatus; macrotrema in Pallidus; bipindiensis in Pseudofavolus.

GROUP 3, UNGULAFORMIS.

(Hexagona of the "Fomes" type are few in number, but very marked species.)

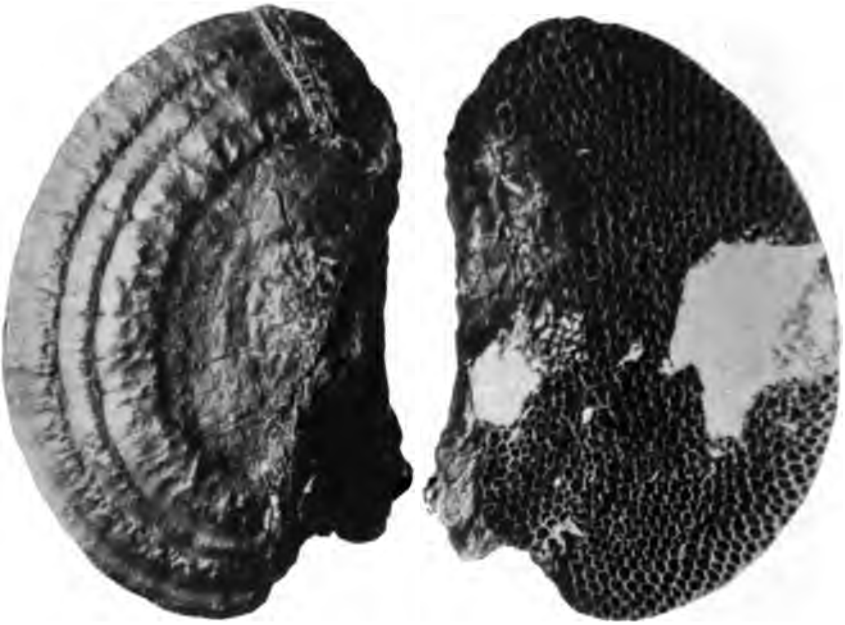

Fig. 290.

Hexagona nitida. Type at Paris.

HEXAGONA NITIDA (Fig. 290).—Pileus with a hard, smooth, sulcate, polished crust. Context ferruginous, hard. Pores medium (5 to cm.) deep, 1½ to 2½ cm., reaching the crust.

This is the only Hexagona that occurs in Europe, and it is known only from two stations in the extreme south. It was first found in 1829 in the Pyrenees, and in Algeria in 1844. Both were on the live oak (Quercus Ilex) and came to Montagne, who named the species. He gave a good figure in Flora of Algeria. Then Dr. Marcucci seems to have collected it abundantly in Sardinia and his specimens (Exsiccatae No. 69) are in most of the museums under the name "Hexagona (Favolus) Mori Poll.," Dr. Marcucci having referred it in error to an old figure of Pollini, to which it has little resemblance. Afterwards Baglietto, noting the mistake, naturally discovered it must be a new species and called it Hexagona Marcucciana.[16] At Paris, where it can be compared with Montagne's specimen, I doubt if one can be told from the other if they were transposed. I think Professor Maire has collected it in Greece, but I have seen none of his specimens. Hexagona nitida from what is known seems to occur only on the live oak (Quercus Ilex) and only in the Mediterranean countries. There are several of Marcucci's collections in the museums, mostly now badly eaten. The only good specimen I have seen is the Algerian collection in Montagne's herbarium, from which our figure (290) has been made.

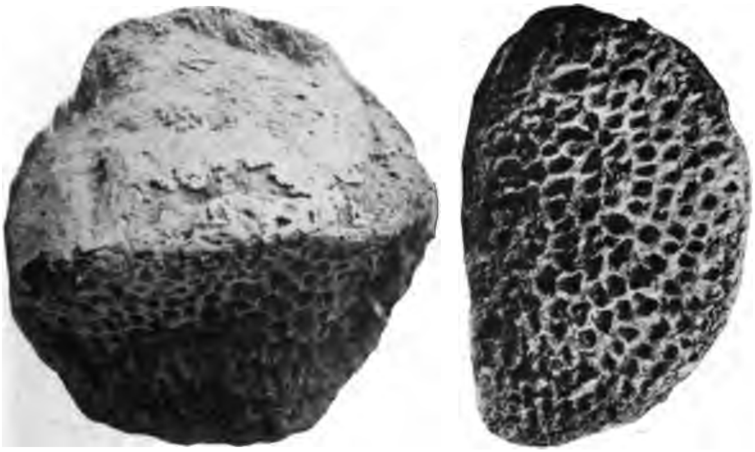

Fig. 291

Hexagona Gunnii. Co-type at Paris.

HEXAGONA GUNNII (Fig. 291).—Pileus ungulaform, with a thin, fragile, smooth, reddish brown crust which appears to me slightly laccate. Context thick, ferruginous.[17] Pores large, concolorous, with thick walls.

This species is represented at Kew by several collections from Tasmania and Australia. I think it grows on Eucalyptus trees. Berkeley named it in 1839 as Polyporus vesparius, and then changed it (unfortunately without Otto Kuntze's consent) to Hexagona Gunnii.[18]

HEXAGONA SULCATA (Fig. 292).—Pileus subligneous, with a hard crust and deep, sulcate ridges. Context ferruginous. Pores medium (4-5 to cm.) deep, rigid, pale wood color.

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[16] This was in "Erbario Crittogamico Italiano," where Marcucci's collection was again distributed. The advertisement is given in Saccardo as "Bagl. & de Not," but they were both lichen men. I suspect Cesati was really responsible for it, as he seems to have been the chief fungus man of these exsiccatae.

[17] I think this is the only species known with a strong development of the context. Usually the pores almost reach the crust.

[18] I do not know why Berkeley changed the specific name when he put it in Hexagona, but he no doubt had good reasons for it, and he thought he had the right. At any rate it was before our "lawmakers" had legislated on the subject as to what a man has a right to do in his own private affairs.

This strongly marked species is only known from Ceylon. Berkeley published it in 1847 with a good figure and sent specimens to both Fries and Montagne. That sent to Montagne (Fig. 292) was typically sulcate, but the specimen to Fries (Fig. 293) was more even. Berkeley did not retain a specimen in his own herbarium, and when some twenty years later he received the smooth form also from Ceylon he described it as Hexagona durissima. It is the same as the specimen of sulcata he sent Fries. Whether or not it is the same species as sulcata I do not know, but I think probably only a smooth form.

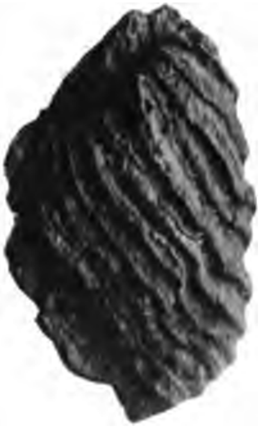

Fig. 292

Hexagona sulcata.

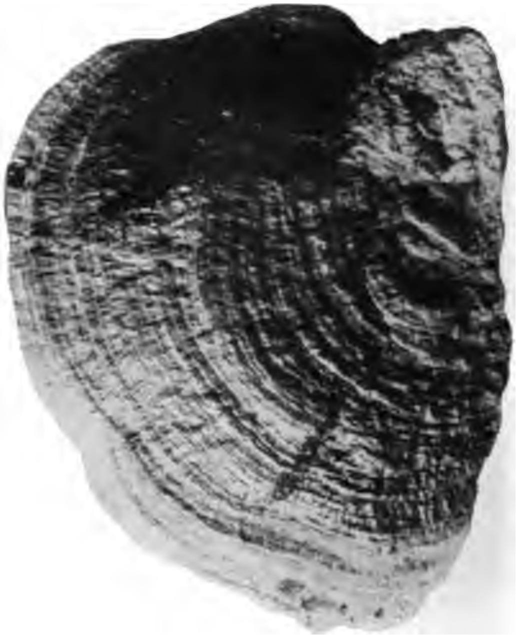

Fig. 293.

Hexagona durissima.

HEXAGONA DURISSIMA (Fig. 293).—This seems to be practically the same plant as sulcata except it has a more even crust. It is known only from Ceylon, but recently I have seen a specimen so referred, and probably correctly, from Java.

HEXAGONA RESINOSA (Fig. 294).—Pileus applanate, with a dark resinous crust. Context hard, sub-woody, pale alutaceous or pale ferruginous. Tubes medium, 5 to cm., 1 to 1½ cm. deep, pale color, with rigid walls. Spores (teste Murrill) hyaline, smooth, 4 x 6.

This species was recently well named by Murrill, from the Philippines, and is very different from all others. It is known only from one collection or record.[19] Its natural relations I think are with Fomes pinicola, the same resinous crust, same context, and the coloration both of context and crust is similar. There is no similar plant in the genus Hexagona, and it might well be made the type of a new genus. We place it in this section on account of its evident "Fomes" relationship, though as to form it belongs in the next, and as to context color it approaches the section Pallidus.

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[19] Polystictus Copelandii, as distributed by the Philippine Bureau of Science, No. 1214 (specimen sent to Kew), is evidently Hexagona resinosa, through some transposition of specimens. Mr. Murrill has introduced enough confusion with his jargon of names among the Philippine polyporoids, without having the subject further confused by transposition of specimens in distributed sets.

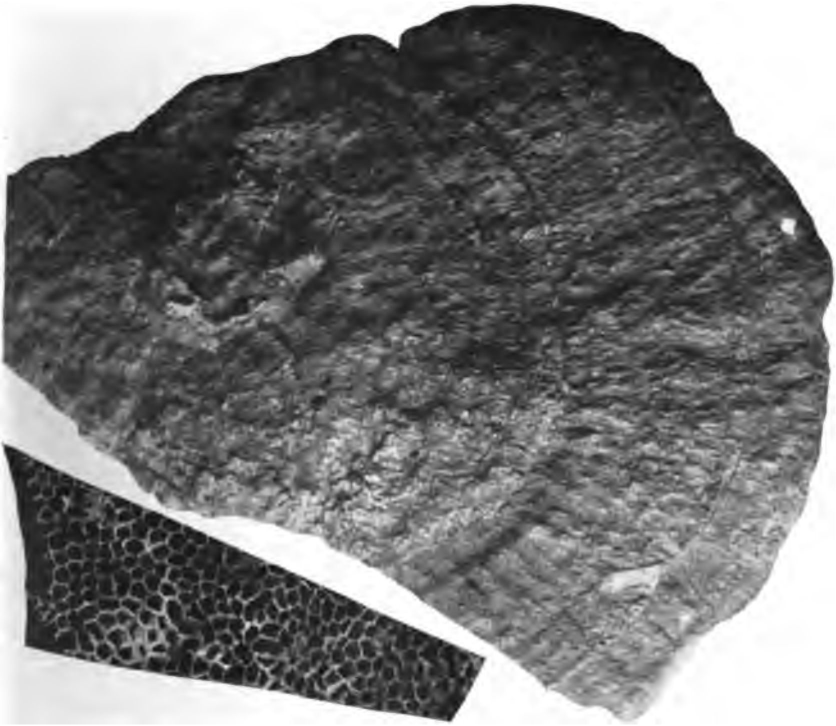

Fig. 294.

Hexagona resinosa. Co-type in museum at Berlin.

Note.—Hexagona laevis was based on nondescript material from Andaman Islands. There is one poor specimen at Kew and another at the British Museum. I judge it belongs in this section.

GROUP 4, APPLANATUS.

This is an artificial group to include species that have no one prominent character to throw them into other groups, and which are flat but not too thin.

HEXAGONA POBEGUINI (Fig. 295).—Pileus applanate, with concentric, sulcate zones, and minutely pubescent. I think the pubescence wears off to a certain extent on old specimens. Context subligneous, harder than others of this group, ferruginous. Pores large 2-3 to cm., ferruginous, with rigid walls and setae.

This seems to be a frequent plant in Africa, and several collections are at Paris and Berlin. One at the British Museum was named Hexagona Welwitschii. In fact, the plant was discovered to be a "new species" in each of the three museums where it is to be found.[20] The zones of the pileus are sometimes (in the type specimen) colored with different shades of brown. The pores of the type were crenate, but that was only an accidental character of this particular specimen. The pores vary in size, as shown in our figures.

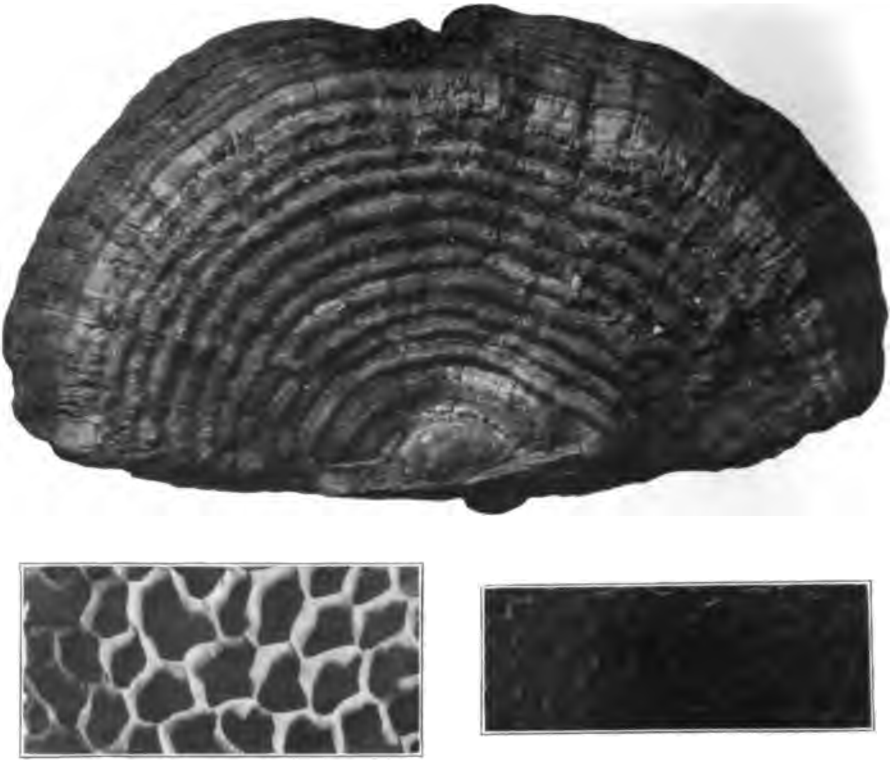

Fig 295

Hexagona Pobeguini.

HEXAGONA NIAM-NIAMENSIS (Fig. 296).—Pileus *smooth*, unicolorous, with narrow zones. As to surface it much resembles Hexagona tenuis. Context ferruginous. Pores medium, about 4 to cm., regular, with thin hexagonal walls, ½ cm. deep. They have no evident setae and some of them (not all) are glaucous.

This is known from a single specimen (Fig. 296) from Africa at Berlin. The specific name, while alleged to be Latin, is more probably from an Ethiopian dialect. It is a terrible misfortune for a plant to have to bear such a name as that.

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[20] In a case of this kind we are very much disposed to take the best name, as we believe plants should be given decent names. Where a poor plant has had the misfortune to be named Pobeguini, Stuhlmanni, and Welwitschii, there is not much choice.

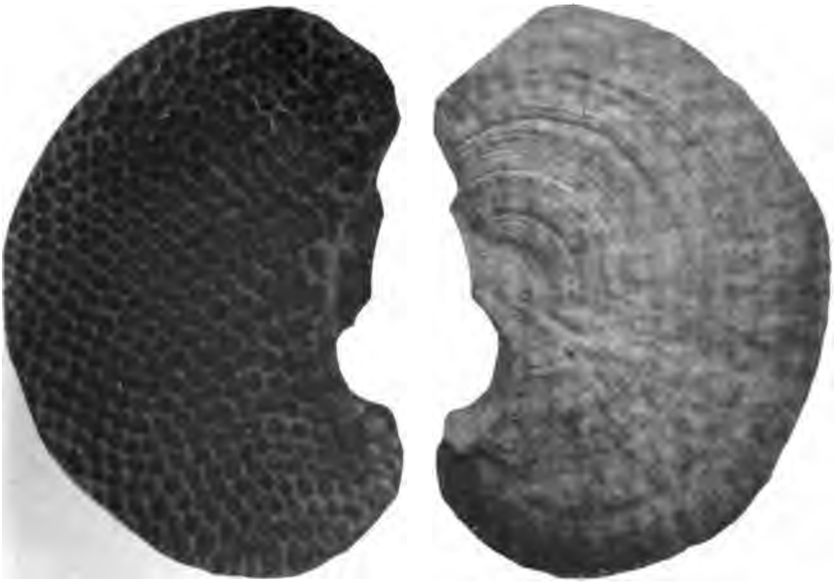

Fig. 296.

Hexagona niam-niamensis. Type at Berlin.

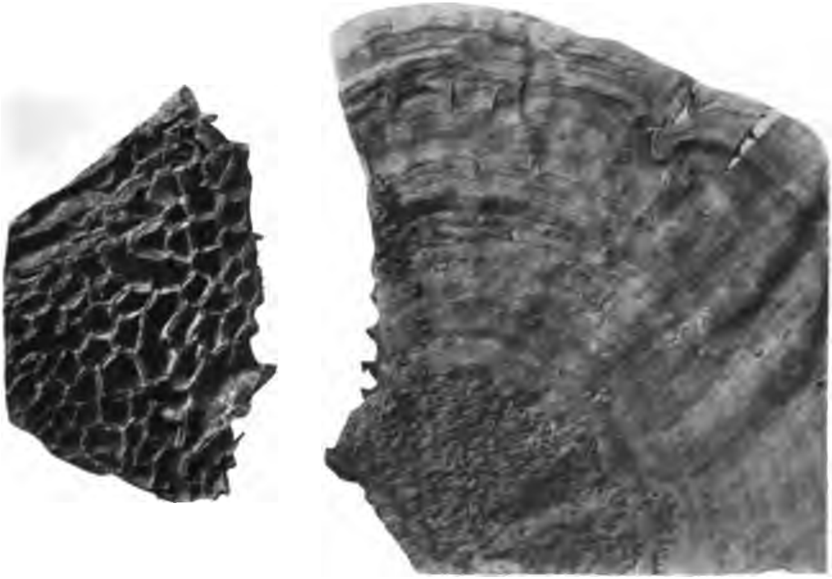

Fig. 297.

Hexagona chartacea. Type at Paris.

HEXAGONA CHARTACEA (Fig. 297).—Pileus rather thin, smooth, with narrow zones. Pores large, about 3 to cm., 5 mm. deep, with thin walls. Color ferruginous and setae evident.

This is rather a thin species for this group and is known from two collections from Africa. One of the collections was named Hexagona obversa, but seems to be too close to be kept distinct. I can see very little application of the name chartacea to this plant.

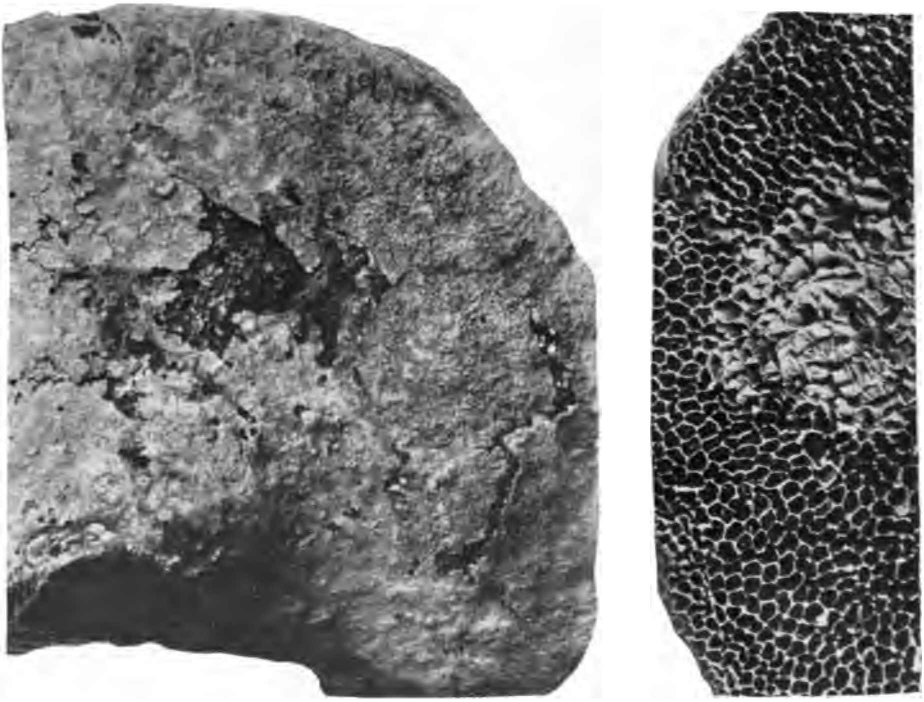

Fig. 298.

Hexagona leprosa. Type at Upsala.

HEXAGONA LEPROSA (Fig. 298).—Pileus with a thin, dull, slightly pubescent crust, not zoned. Context soft, spongy, ferruginous. Pores medium, 4-5 to cm., 1½-2 cm. long, with thin walls. The inner surface of the pores is pubescent under the lens, with short, pale hairs. The color of the entire plant is almost uniform.

This is known only from a single specimen, collected in the West Indies,[21] about sixty years ago and preserved in a jar at Upsala. There is a small co-type fragment also at Kew.

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[21] It has been stated "also in Brazil." I know not the source of this statement, but am sure there is no specimen from Brazil in any museum of Europe that I have visited.

HEXAGONA SPECIOSA (Fig. 299).—Pileus with a thin, zoned, smooth crust. Context and pores ferruginous. Pores medium large, about 4-5 to cm., 1-1½ cm. deep, with thin walls becoming lacerate.

In size, shape, and color this plant is much like the preceding. It is known from a single specimen in a jar at Upsala and a co-type at Kew. It came from South Africa sixty years ago.

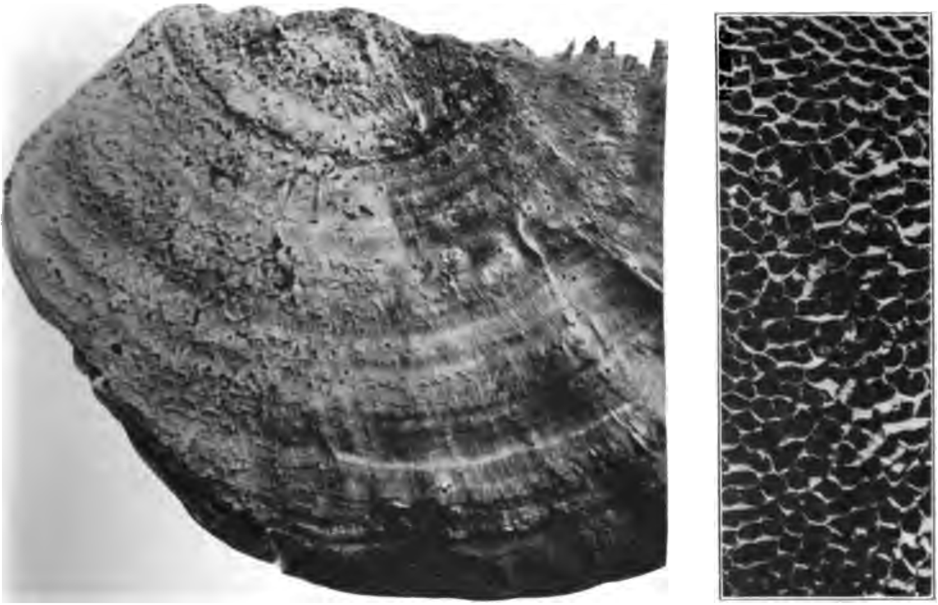

Fig. 299

Hexagona speciosa. Type at Upsala.

HEXAGONA KURZII (Fig. 300).—Surface dark reddish brown, rugulose, zoned. Pores medium 5 to cm., 5 mm. deep, strongly glaucous.

This came from India and has a general resemblance to Hexagona polygramma.[22] The pores are too deep, however, to be entered in the section with polygramma.

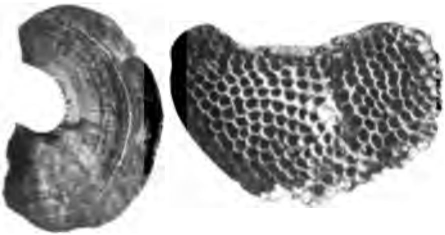

Fig. 300.
Hexagona Kurzii.

HEXAGONA ERUBESCENS (Fig. 301).—Pileus *rigid*, about 2 cm. thick, with a smooth zoned crust. Pores irregular, angular, about 5 to cm., 1-1½ cm. deep, with *rigid*, rather thick walls. No setae.

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[22] The co-type collection is at Kew on a sheet of polygramma.

This is based on a collection by Spruce, Brazil, and is at Kew. The collector states "Hymenium vinosum," hence Berkeley named it erubescens. The pores have lost all vinous color now. The strong character of the species for me is its *rigidity*, both of pileus and pores. The species is found in Saccardo in section "Hirtae." The type has not a sign of a hair of any kind. There is a collection at Kew, however, that was referred to erubescens, and which has appressed fibrils, but I think it quite another (and a "new") species. I should prefer that some one else name it.

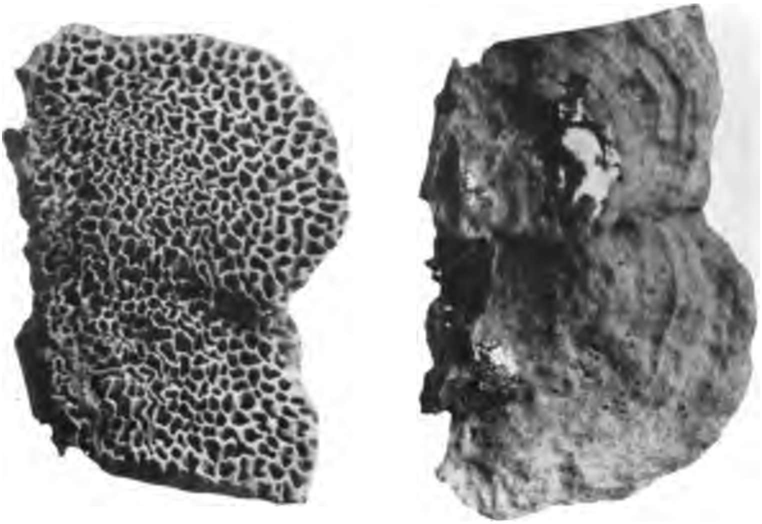

Fig 301.

Hexagona erubescens. Type at Kew.

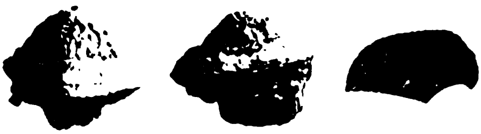

Fig. 302.

Hexagona amplexens.

HEXAGONA AMPLEXENS (Fig. 302).—Pileus small, ungulaform, gibbose, smooth, with sulcate zones. Context brown, suberose. Pores 5-6 to cm., 5-8 mm. deep, concolorous, with thin walls, no setae.

This little species is unique in size and shape. It is known from one collection in the herbarium of Patouillard, and came from New Caledonia. It evidently grew on small branches which it partially encircled.

SECTION 5, TENUIS.

This group is the most important of all for it embraces the only common species that grows in many warm countries, viz.: Hexagona tenuis. They are *thin* plants, rarely over two or three mm. thick, with smooth, concentric-zoned pilei. The pores are small and shallow. Sometimes the plants are called membranaceous, but I think are not thin enough to be called membranes.

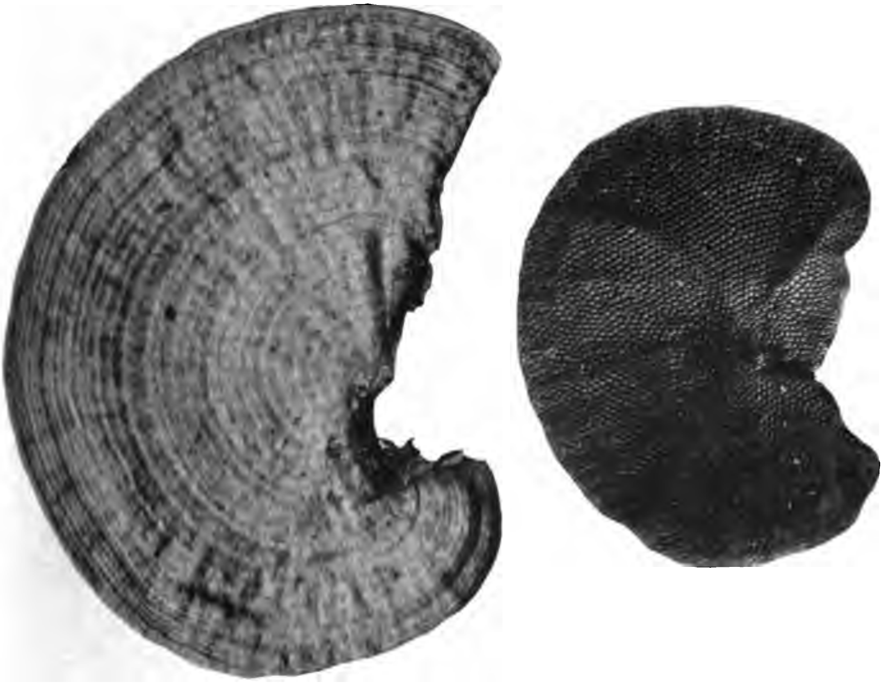

Fig 303

Hexagona tenuis. (Type form.)

HEXAGONA TENUIS (Fig. 303).—Pileus rigid, with a smooth, concentric-zoned surface. Context thin, about 2 mm., ferruginous. Pores small, regular, round, 8-12 to cm., shallow.

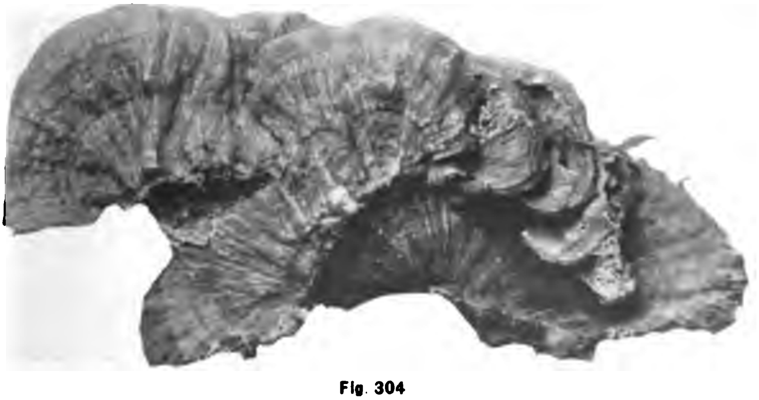

Fig. 304

Rugulose form classed as Hexagona tenuis. (Kew.)

This is a widely distributed plant and occurs in most warm countries of the world. Like all widely distributed plants it varies, and it is not practicable to maintain all the specific names that have been given to it. As to pore size those with the smallest pores were named Hexagona pulchella (Fig. 305), then the type size (Fig. 306) and the largest size (Fig. 307) were called Hexagona polygramma. With hardly two collections with exactly the same sized pores, it is difficult to maintain these "species." And yet the pore sizes have some value for they are usually uniform in specimens of the same collection. They also vary as to color, and particularly in the development of a glaucous pore covering. Some collections have no sign of it, others are partially glaucous, and others strongly glaucous. Hexagona cervino-plumbea is only a glaucous form.

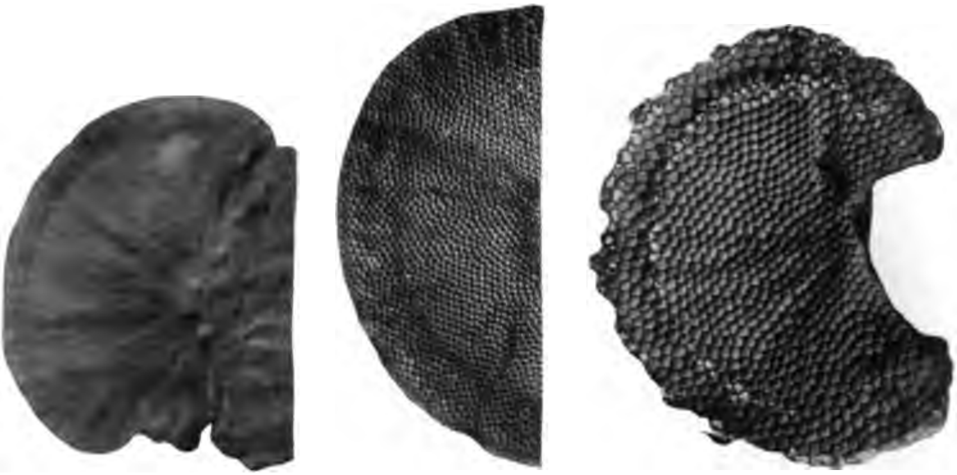

Fig. 305. **Fig. 306** **Fig 307**

Comparative pore sizes. **Fig.** 305, **pulchella. Fig.** 306, **tenuis** (type). **Fig.** 307, **polygramma.**

History.—The first specimen recorded was brought by Humboldt from South America and is still preserved in Hooker's herbarium. It was published by Hooker as Boletus tenuis in Kunth Synopsis (1822) and in the preceding paragraph an anomaly of the same species as Boletus reticulatus.[23] However, this was not the first specimen to reach Europe, for it is found in the Linnæan herbarium with no clue to its source. It is labeled "Boletus favus, Linn.," an obvious error as pointed out first by Klotzsch, then by Berkeley, and very recently by Mr. Murrill.[24] Hexagona tenuis is a very common species in many countries and like all such species has been discovered to be "new" on numerous occasions.[25] A number of these seem to me to be absolutely the same plant, and I can see no difference whatever on which to base "new species."[26] Others do differ slightly from the type form, but whether this is of specific importance or not it is difficult to say.

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[23] As this was published at a "previous date," according to Kuntze's method of reckoning dates, it was necessary to find another species called reticulatus to put forth as a reason for not taking the name. This was not a Hexagona, but that was a minor matter compared to the importance of Hooker having published reticulatus in a previous paragraph to tenuis in the same book. It was Klotzsch who first recognized that reticulatus was only an altered condition of tenuis, and he so indorsed it on the label, from whence was obtained the information that was dilated upon at length recently, forgetting to mention that it had all been published in full by both Klotzsch and Berkeley many years ago.

[24] "Im Linne'schen Herbarium, Boletus favus ist Polyporus tenuis, Hooker."—Klotzsch, 1832.

"Hexagona tenuis is marked in the Linnaean herbarium Boletus favus, but not by Linnaeus, with whose description it does not correspond. The name is evidently not authoritative."—Berkeley, 1842.

"This species is found in the Linnaean herbarium marked Boletus favus, but not by Linnaeus, nor with his sanction."—Murrill, 1905.

Had Mr. Murrill, instead of copying Berkeley, done a little investigating in the Linnaean herbarium he would have found that "this species" was named by Dickson many years after Linnaeus died, and under the circumstances he would have had considerable trouble in obtaining Linnaeus' "sanction."

Forms of Hexagona tenuis or related plants.

HEXAGONA PULCHELLA (Fig. 305).—This plant from Java seems exactly the same as the type form except smaller pores.

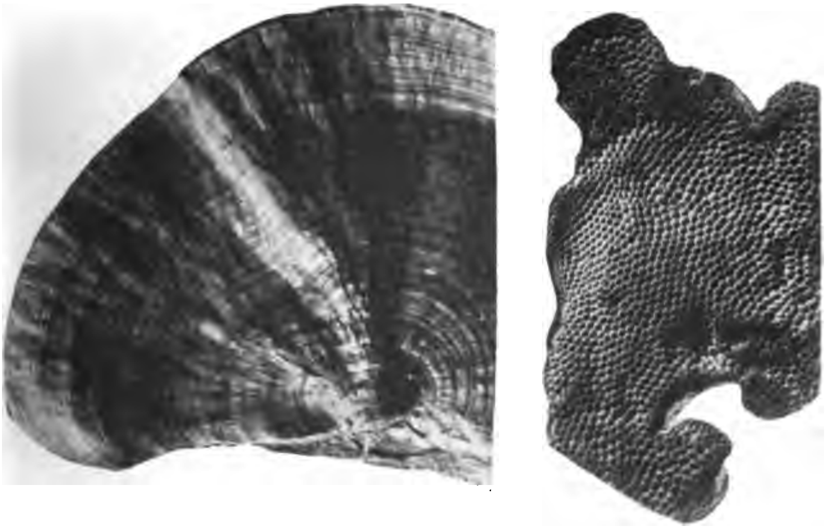

Fig. 308.

Hexagona polygramma.

HEXAGONA POLYGRAMMA (Fig. 308).—Originally from Cuba, the type is practically the same as that of tenuis with pores slightly larger. In most museums, however, all these similar plants are arranged in two covers, one "Hexagona tenuis, Hooker," the other "Hexagona polygramma, Mont." I can not believe that the namers have any distinct idea of a difference, for in both covers I have found indiscriminately collections varying as follows:

Size of spores.—From very small, as shown in Fig. 305, to size medium, as shown in Fig. 307.

Surface.—Relatively smooth and evenly zoned, as Fig. 303, to strongly rugulose, as shown in Fig. 304.

Color of pileus.—Very pale, almost white to brown, and many deep reddish brown.

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[25] Not necessarily all, however, that are raked up and tabulated. Thus "Polyporus bivalvis, Pers.," given as a synonym, has little resemblance to it and is not a Hexagona. A good specimen is in Persoon's herbarium. "Hexagona cingulata, Lév.," and "Hexagona unicolor, Fries," are also said to be synonyms, but that is only a vague guess, as no specimens of either exist, and the compiler knew nothing about them.

[26] For further details see list of synonyms, pages 43 to 45.

Color of pores.—Pure cinnamon or ferruginous to dark (fuscus), sometimes bright silvery, glaucous.

At Kew there are ninety-two collections in these two covers and scarcely any two of them exactly the same. Under these conditions it is only practical to do as has been done and refer all to one or two species.

The following we should consider as forms of Hexagona tenuis, and we could manufacture as many more if we were so disposed.

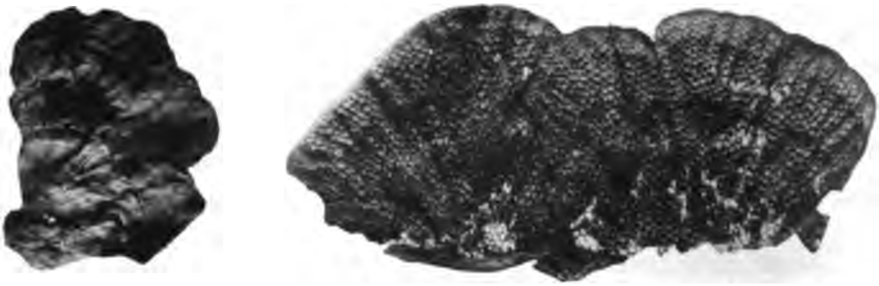

Fig. 309.

Hexagona umbrinella. Small one is the type at Upsala.

HEXAGONA UMBRINELLA (Fig. 309).—This has a dark reddish brown, rugulose surface.[27] The same thing is also called Hexagona Dregreana. Hexagona Boneana is also too close.

HEXAGONA CONCINNA is a very thin plant with small, dark pores and dark reddish pileus.

HEXAGONA DISCOPODA is a plant with the reddish stain only *partially developed* over the base of the pileus so that the plant is decidedly *two-colored.* It seems to be a frequent form in Africa and abundant specimens reached Hennings and were referred by him to Hexagona polygramma. It is probably the same as tricolor named by Fries from Africa many years ago (because of its color contrasts), but no specimen is known now.

HEXAGONA SUBTENUIS was named by Berkeley from India, but I think not published. It has ferruginous colored pores that to me under a lens appear slightly pubescent.

HEXAGONA PHAEOPHORA is a form with pale pileus and *dark* pores.

All the preceding are *thin* plants, very similar to Hexagona tenuis, and differing principally in color, pore color, and pore size. The four following, rigida, similis, Muelleri, and nigrocincta, are thicker plants (relatively), but with the same general characters and small regular pores. They differ among themselves as do the forms of tenuis. All come from the same geographical region, Australia, New Caledonia, and the Pacific Islands, and all, I think, are better considered as forms of one species.

HEXAGONA RIGIDA (Fig. 310).—Pileus about 3 mm. thick, with smooth or slightly rugulose zoned surface and small regular pores.

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[27] The "co-type" that Fries sent Berkeley of Hexagona umbrinella is a much thicker specimen than is to be found in his own herbarium. I think it is not the same species.

The plant is close to Hexagona tenuis as to color and general appearance, with slightly deeper pores. It came from Australia. Hexagona Muelleri, also from Australia, and based on a single specimen, is practically the same with slightly more rugulose surface. Hexagona nigrocincta is for me a pale form of rigida, paler color and smoother than type of rigida. It came from New Caledonia, and the ordinary form of rigida also occurs there.

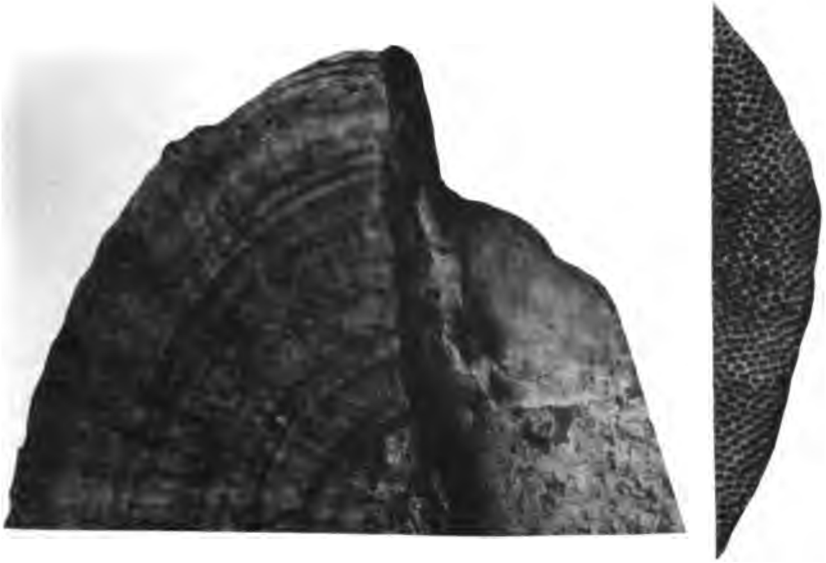


Fig. 310.

Hexagona rigida. Type at Kew.

HEXAGONA SIMILIS.—The type specimen is of a very dark color with agglutinate, fibrillose zoned surface, so that it has relations to the section Setosus. None of the fibrils are free, however, and I think it is closer to rigida. The pores are quite small and dark colored. The "type" is the only one in the cover that has the agglutinate fibrils strongly marked. Others so referred seem to me much closer to rigida.

HEXAGONA ATROSANGUINEA (Fig. 311).—Plant growing on under side of stick, and largely resupinate with narrow, pileate margin. Pileus thin, smooth, deep *blood brown* color. Pores small, rugulose, shallow, many *colored similar to the pileus,* and also with a glaucous deposit.

This species is very marked and the only one I have noted where the pores are strongly colored red-brown. Its habit of growth is also different from usual, and abundant specimens at Berlin all seem to have the same habits. Whether it ever takes a truly pileate form I do not know, but I judge not, as I think all the abundant types at Berlin are of the same nature. It came from Africa and is only found in the museum at Berlin.

HEXAGONA SACLEUXII (Fig. 312).—Pileus rigid, with a smooth, pale, strongly concentrically ridged surface. Pores vary in the same collection (as shown in our figures) as to size. The large pores are about 5 mm. deep and strongly glaucous.

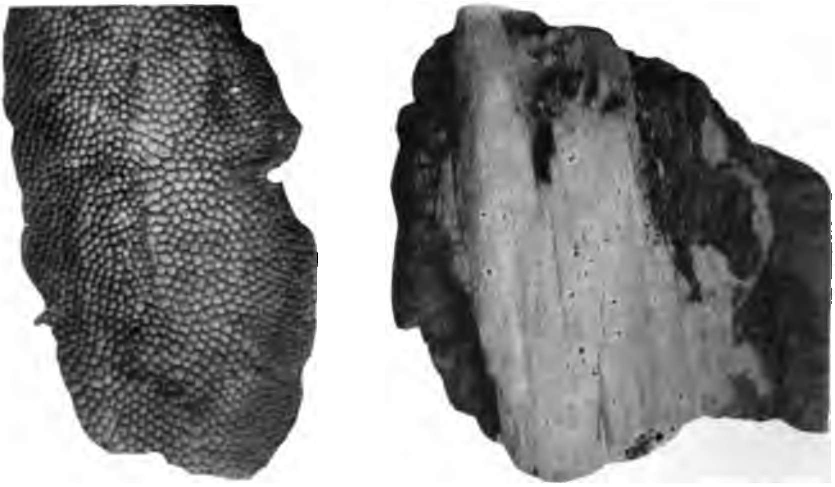


Fig. 311

Hexagona atrosanguinea. Type at Berlin.

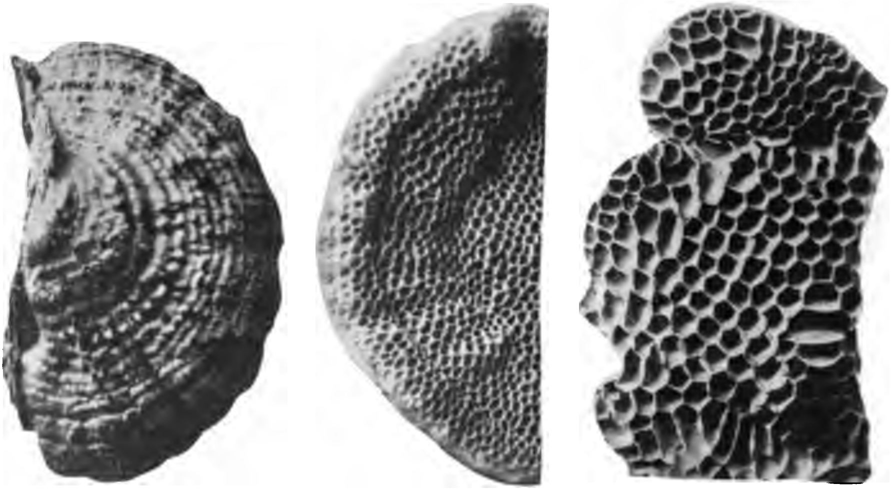


Fig. 312

Hexagona Sacleuxii. Type at Paris.

This is known from three collections at Paris, all from Africa. The pores are deeper than others of this group, otherwise it is close to rigida. The variation of pore sizes in the same collection is unusual, and I am not sure but that it is due to different ages. The large pores are strongly glaucous, the small pores not at all.

SECTION 6, PALLIDUS.

This section is quite distinct from all that precede in the *pale color* of its context. One species (albida) when fresh is *pure white* but discolors some in drying. The usual color of the museum specimens of this section may be called pale ochraceous or isabelline. I doubt if there are any in this section that are true Hexagonas. Probably all have the character of the *variation of the hymenium* strongly developed. In Hexagona albida (cfr. Figs. 313 and 314) and particularly in Hexagona ochroleuca the hymenium takes *hexagonal, daedaloid,* and *lenzitoid* forms and this tendency to *variation* is as much a *specific character* as any character a species can have.

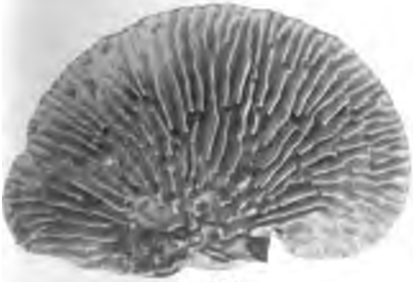
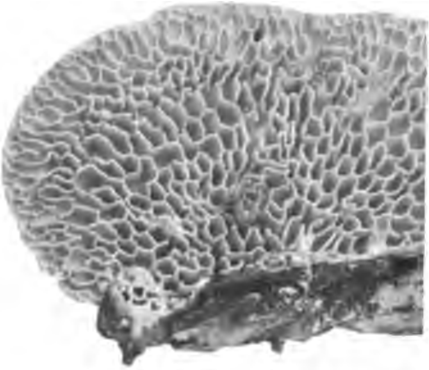


Fig 313



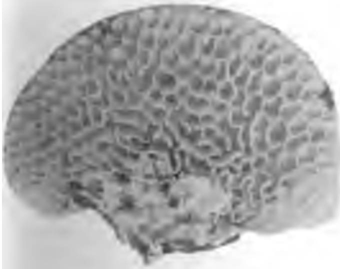


Fig 314

Hexagona albida. Photographed in Samoa.

HEXAGONA ALBIDA (Figs. 313 and 314).—Pileus pure white with soft, smooth, faintly zonate surface. Context soft, almost fleshy when fresh, in drying it becomes discolored in time and more tough. Pores large, irregular, about 5 mm. deep with thin walls. Sometimes lenzitoid forms (Fig. 313) are found growing with the hexagonal forms and our figures (313 and 314) are specimens that grew from the *same mycelium.*

History.—This plant was described under this name by Berkeley from the Philippines, and seems to occur mostly in Australia and the Pacific Islands. I found it in Samoa, but it is not common there. In Samoa it usually took the hexagonal form, rarely the lenzitoid form, but in other localitites it may run more often to lenzitoid forms. It is the same plant, I believe, as Daedalea inconcinna, also from the Philippines, and Daedalea intermedia from Australia. I think Hexagona Cesatii from Borneo is exactly the same thing, with a tendency to become a little cyclomycoid. When the history of these polymorphic plants is worked out it will probably be found to have names in other genera such as Lenzites.

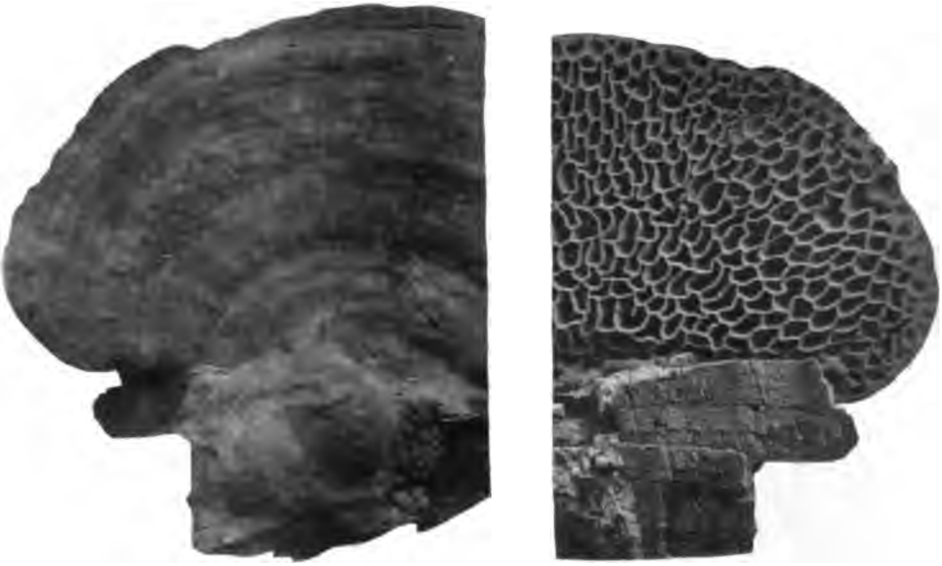


Fig. 315

Hexagona macrotrema. Type at Leiden.

HEXAGONA MACROTREMA (Fig. 315).—The description of Hexagona albida covers this species also, for it is the same thing excepting that the surface is distinctly pubescent. However, they are undoubtedly forms of the same species and they occur over the same region (Pacific Islands).

Hexagona macrotrema was first collected by Junghuhn in Java and so named by him on the label. The specimen is to-day found in Leiden in good condition and bears only Junghuhn's original label. Before he published it, however, Léveillé visited the museum, saw the specimen, changed its name, and published it as Hexagona Molkenboeri. This did not please Junghuhn (naturally) and he wrote to Fries, who, when he published it used Junghuhn's name.[28] The name Molkenboeri is therefore "prior" from an Otto Kuntze point of view, and while I have great regard for priority it does not appeal to me when served with so much rascality. Therefore I use the name macrotrema.

Hexagona macrotrema is rather rare in the museums and has been mostly named albida. I have seen only the following three specimens: Java (Leiden),

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[28] The plant is found in Saccardo, vol. 6, p. 369, under both names, pretending to be two different species, although both names were based on exactly the same specimen.

New Guinea (Berlin), Tropical Africa (Kew). As in the case of Hexagona albida, it is probable that it takes other hymenial forms.

HEXAGONA OCHROLEUCA (Figs. 316 to 319).—We shall not enter here into any detailed account of Hexagona ochroleuca, for it is usually not a Hexagona. In fact the name glabra is the only specific name that was given to it as a Hexagona, although it has a dozen other names, as Trametes, Daedalea, Lenzites, Sistrotrema, etc. Generally it is a Lenzites, and if we ever consider it in detail it will be as a Lenzites, its usual form.

Hexagona ochroleuca is the most polymorphic species known, I think, and takes hexagonal, lenzitoid, irpicoid, and daedaloid forms, often *in the same specimen*. Our figure (318) shows three distinct hymenial forms. The hexagonal forms are rare and the type of glabra (Fig. 317) is the only one so named as a Hexagona, though several "species" of Trametes are based on the same thing. I have seen many lenzitoid forms. Léveillé named this specimen Hexagona glabra, and another specimen of the same collection (Roux, India) he called in the same paper Sistrotrema ochroleucum. These plants are in the same cover at Paris, and they are surely the same species notwithstanding the hymenium is so different.

Hexagona ochroleuca has but few constant characters, none of a hymenial nature, and can only be learned by experience. Its consistency, *color of context* (alutaceous, not white when fresh), surface, and *distant* plates are the main characters by which it can be known from its equally abundant and equally polymorphic neighbor, Lenzites repanda. Hexagona ochroleuca, in its various forms as Trametes, Lenzites, etc., is a very abundant plant in India, Java, Philippines, and the East in general, and also in Australia.

We have not thoroughly investigated its synonymy, though we believe the following should be included: Polystictus lenziteus (Zollinger Col.), Sistrotrema ochroleucum, Hexagona glabra, Daedalea lurida, Daedalea pruinosa, all by Léveillé, who seems to have discovered it was a "new species" every time he saw a specimen.

Trametes Beyrichii (as to Berkeley's Philippine determination, Cummings 2202).[29] Trametes colliculosa from Ceylon, Trametes lobata from India, Trametes laeticolor from Ceylon, Daedalea Hobsoni from India (or Australia?),[30] and numerous recent determinations from the Philippines.[31] Daedalea Schomburgkii

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[29] As to Fries, from Brazil, it is doubtful, as Hexagona ochroleuca is not known from America. No specimen of Trametes Beyrichii exists, and what it was is unknown.

[30] Daedalea Hobsoni was published in a paper on Australian fungi and was based on a collection cited, made by Schomburg in Australia. Hobson collected in India, and Berkeley refers to his specimen incidentally as "the original specimen," though never formally published. Under these conditions our lawmakers ought to specifically tell us which is the "type locality" and which the "type specimen," as they put so much stress on those things. In this instance I think it makes no vital difference, because both are the same plant. Cooke afterwards discovered the "type specimen" of Daedalea Hobsoni, which Berkeley had labeled Daedalea Schomburgkii and sent Saccardo (cfr. Vol. 6, p. 376) a description of this interesting "new species," though based on exactly the same specimen that Berkeley had described sixteen years before. As evidence of the value of our literature Saccardo puts it in a different section of the genus from the one in which he places Daedalea Hobsoni, although both were based on the same specimen.

[31] It appears to me that Mr. Murrill's priority investigations were very superficial as to these plants (as with most others). He uses the name Hobsoni (1865), and it has a dozen names "prior" to that. Bresadola habitually calls the plant "Daedalea lenzitea (Lév.), Bres.," which was 1854, and Léveillé had four names prior to lenzitea, to say nothing of Berkeley's discoveries. In the whole list it does not have a suitable name, or I should use it without regard to the date. Léveillé's name ochroleuca is probably the best. I presume, however, some enterprising individual could take the synonyms I have cited, look up their dates, arrange them chronologically, and produce weighty evidence why ochroleuca can not be used.

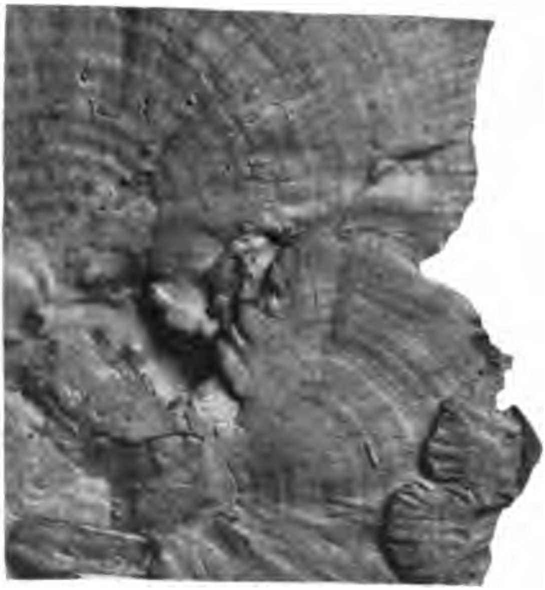

Fig. 316

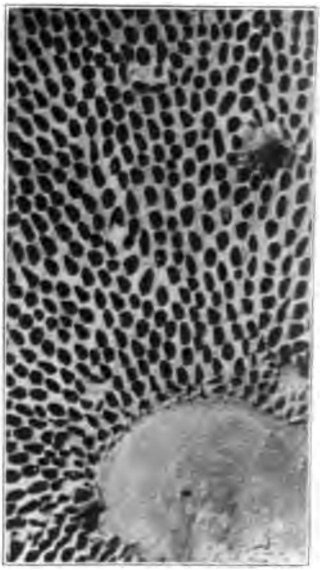

Fig 317.

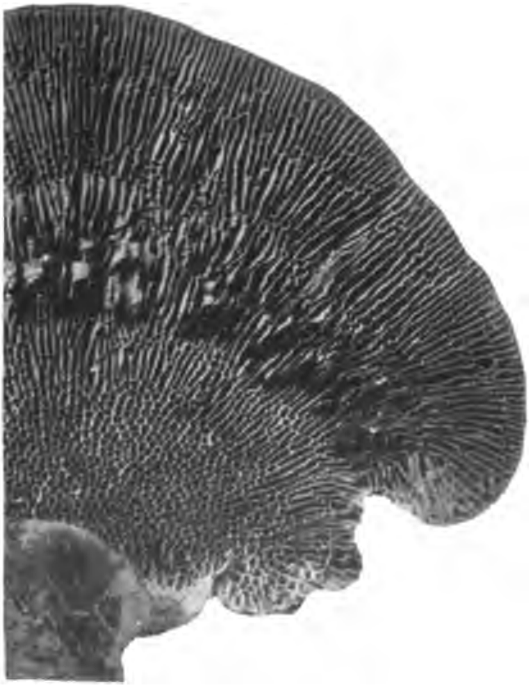

Fig. 318

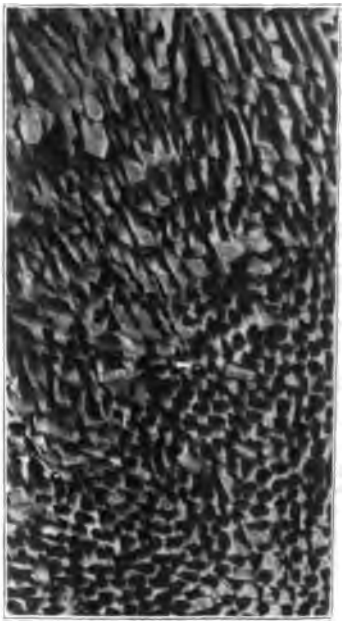

Fig 319.

Hexagona ochroleuca. Figs. 316 and 317, type forms as **Hexagona**. Fig. 318. a specimen reduced, showing three variations of the hymenium. Fig. 319, an irpicoid form named **Sistrotrema ochroleucum.**

from Australia, Daedalea tenuis from Philippines, Daedalea aulacophylla from Australia, Daedalea flabellum from Andaman Islands, Daedalea ochracea from India, Daedalea sub-confragosa from the Philippines, Lenzites Guilfoylei from Australia, Lenzites ochrophyllus from India.

The old mycologists took the "genera" Trametes, Daedalea, Lenzites, etc., literally, and based a new species on almost every specimen of this plant in every hymenial form that reached them. When the science of mycology gets beyond its "new species" babyhood, and workers take a broader view of species than single "type" collections, then I believe all the species I have mentioned will be held to be the same plant. I call it in this paper Hexagona ochroleuca, but were I writing on Trametes it would be Trametes ochroleucum. The same applies to Daedalea, Lenzites, or Irpex. I think its better name is as Lenzites to correspond with its usual hymenial form, and the equally polymorphic Lenzites repanda.

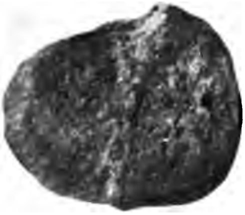
Fig. 320.

HEXAGONA VESPACEA (Fig. 320).—This may be exactly the same plant as macrotrema. It was one of the early Persoonian names (1826) and came from the island of Rawak. No other collection has ever been referred to Persoon's name, and the original collection is only known from two little specimens, one at Paris (Fig. 320), another in Persoon's herbarium at Leiden. These are *thinner* than specimens of the preceding species, and *darker*, though the dark color may be due to age. Persoon described them as smooth, but that they are somewhat pubescent can be seen from our photograph. (Fig. 320.)

HEXAGONA SEURATI (Fig. 321).—Context surface and pores unicolorous, pale alutaceus or isabelline. Context soft, homogeneous with the pores. Surface smooth, no distinct crust. Pores large, shallow, many superficial.

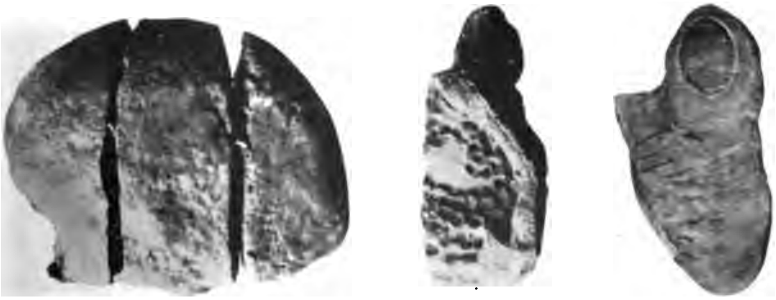
Fig. 321

Hexagona Seurati. Type at Paris.

This species is known only from one collection (Fig. 321) in the herbarium of Professor Patouillard. It came from Raiatea, one of the Society Islands.

HEXAGONA AEQUALIS (Fig. 322).—No better description of this can be given than to say that it is a hexagonal, tropical form of Daedalea quercina. The color, context, surface, everything, is exactly the same as the common

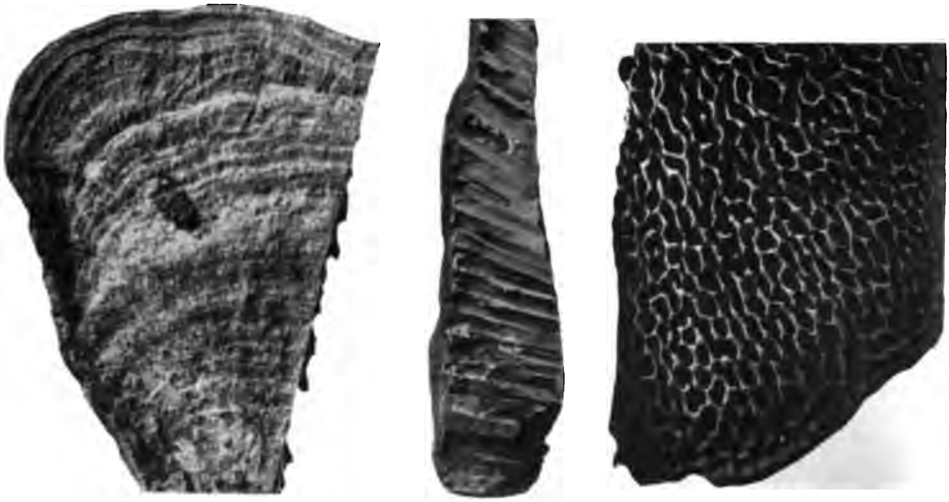

Fig. 322.

Hexagona aequalis. Type at Paris.

plant of Europe excepting the hymenial configuration. The pores, as will be seen from our photograph, are not truly hexagonal, but tend to daedaloid. Daedalea quercina is presumed not to occur in the tropics. If it does, this plant must be referred to it. It is known from but one collection, South America.[32]

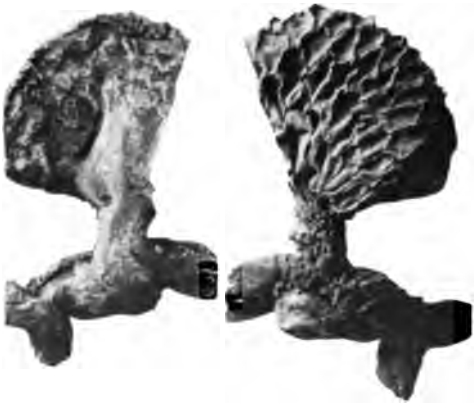

Fig. 323.
Hexagona rhombipora.

HEXAGONA RHOMBIPORA (Fig. 323).—Color pale alutaceous or isabelline, concolorous. Context thin. Surface smooth, no distinct crust. Pores large, flaccid, concolorous, tending to favoloid.

This is known from a single half specimen (Fig. 323) in the herbarium of Montagne. It came from Brazil. No similar specimen has ever reached Europe from South America. I have an impression that it is an aberrant, hexagonal form of some Lenzites perhaps.

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[32] I think it was a Mr. Smith who some years ago distributed some specimens from Central America "determined" by Ellis. Among others was a specimen labeled "Irpex maximus." It has no resemblance whatever to "Irpex maximus," which is only an irpicoid condition of the common Polystictus occidentalis of the tropics. Ellis', of course, had no way of knowing that, and his determinations of tropical species were but little more than a vague guess. The plant that he called "Irpex maximus" I have always considered as a tropical, irpicoid form of Daedalea quercina, the same as I consider Hexagona aequalis to be a tropical, hexagonoid form of the same species.

GROUP 6, PSEUDOFAVOLUS.

This section differs from all that precede it in its fleshy, tough nature, rather than corky-woody. It is not usually classed in Hexagona.[33] Several have been placed in Favolus, from which it differs in the basic idea of the genus Favolus, viz.: the shape of the pores. In my opinion, the species should be included in Hexagona, or if not, should be made into a separate genus. There are but few species known, including, however, the only Hexagona known from the United States.

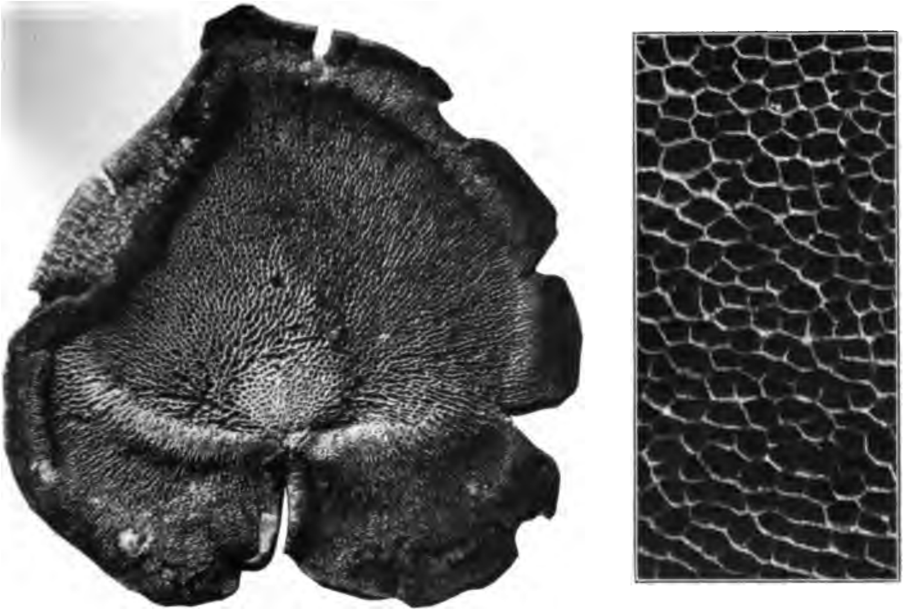

Fig. 324

Hexagona cucullata, natural size and pores x6.

HEXAGONA CUCULLATA (Fig. 324).—Pileus orbicular, reniform, attached by a short disk-like stem. Surface smooth, even, when fresh Mars yellow, when old deep, reddish brown. Pores concolorous, orbicular, a scant mm. wide, shallow.

This seems to be a rather rare plant, occurring in Southern United States, West Indies, and South America. At Kew there are but ten collections, including one from Ceylon (but probably the same) named by Cesati, Favolus chartaceus. In addition it has two other synonyms from the United States, Favolus curtipes and Favolus Taxodii, and I think a third, the recently described Pseudofavolus auriculatus[34] from Louisiana.

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[33] But one of the species, Hexgona Miquelii, is placed in this genus in Saccardo.

[34] I have seen no specimen of this, as when I called it was not to be found. I feel so well convinced, however, that Hexagona cucullata is the only one we have in the United States that I have very little doubt as to its being the same thing.

Related plant.—POLYPORUS ORINOCENSIS (Fig. 325).—With the same color and other characters except its small pores, we mention Polyporus Orinocensis here, for we feel it is a very closely related plant notwithstanding its small pores. Professor Patouillard now places it in the same section with cucullata. It has small pores and they are paler than those of cucullata. When fresh they were probably white. It would not do to classify such a small-pored plant as a Hexagona and we wish Nature would be more consistent and make her species so they would fit into the man-made genera. It would be so much simpler. Polyporus Orinocensis is known from but one collection (Fig. 325) in the herbarium of Professor Patouillard.

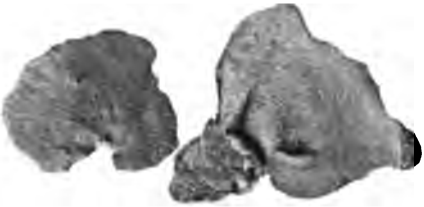

Fig. 325.

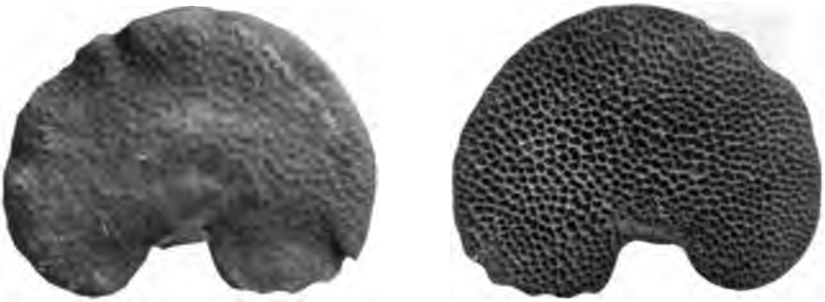

Fig. 326

Hexagona Miquelii. Type at Paris.

HEXAGONA MIQUELII (Fig. 326).—Pileus orbicular, reniform. Color deep reddish brown. Surface glabrous, but *strongly tessellate.* Pores orbicular, shallow, colored.

This, as to coloration, texture, and all characters, is exactly the same as Hexagona cucullata, except that it is strongly marked with a tessellate pileus. It is a very rare plant and but three specimens have ever reached Europe, all of which were discovered to be "new species." First, from Surinam, named Polyporus Miquelii by Montagne, a nice specimen (Fig. 326) in the herbarium of Montagne. Then from Java, by Zollinger, named Polyporus pustulosus by Léveillé, specimen in the herbarium of Professor Patouillard. The third from St. Domingo, named by Berkeley Favolus induratus. All are exactly the same plant.[35]

HEXAGONA BIPINDIENSIS (Figs. 327 and 328).—Pileus thin, orbicular or reniform. Color reddish brown. Surface minutely velutinate, *strongly tessellate.* Pores pale, probably white when fresh, medium round, shallow.

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[35] In a case of this kind, when Mr. Murrill uses the last name, induratus, his reasons are very puzzling to understand. As he has made so much fuss about "priority," we do not know whether he does not know it is the same plant or whether he thinks 1852 is prior to 1841.

This is represented by an abundant collection at Berlin. It came from Africa. It was named as Hexagona bipindiensis on the label by Hennings, but I do not know whether this was published. It is not his Favolus bipindiensis. A single specimen of what seems to me practically the same is found in Patouillard's herbarium under the name Favolus velutinus (Fig. 328). It came from Tonkin and has the same peculiar, velutinate surface. The pores are a little larger and not so regular. I believe it to be, however, the same plant. The specific name velutina can not be used for a Hexagona as it is already occupied.

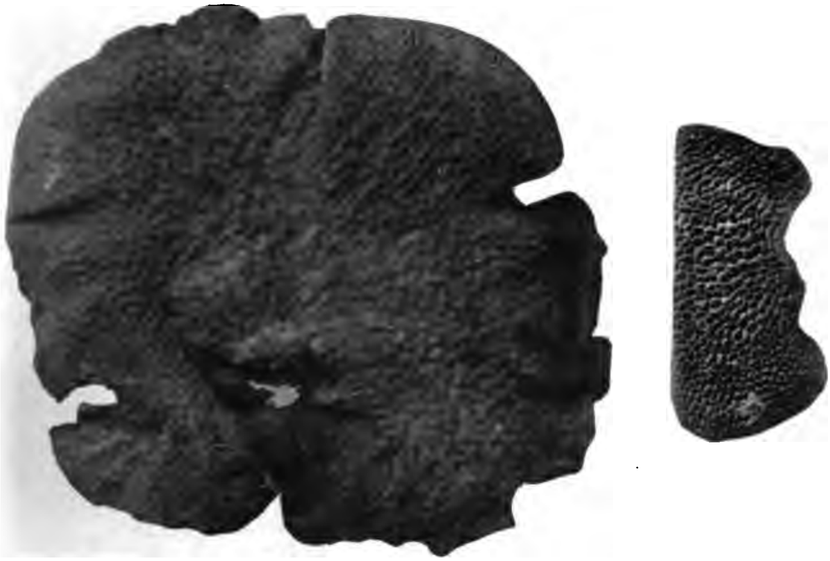

Fig. 327

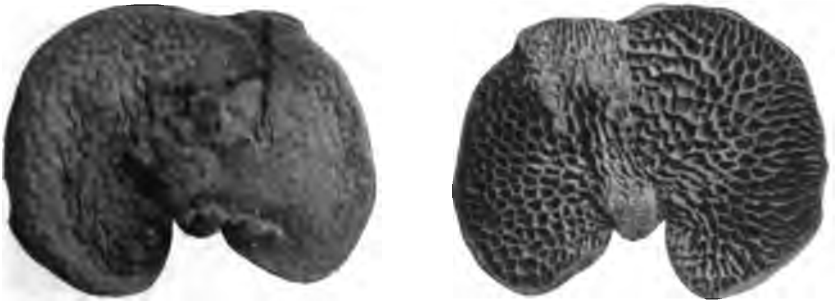

Fig. 328

Hexagona bipindiensis. Fig. 327 is type at Berlin.

HEXAGONA MIRABILIS (Fig. 329).—Pileus white, smooth, thin, with a thin crust. Context none, the pores reaching the crust. Pores 1 to 2 mm. deep, 10-12 to cm., round or hexagonal, white.

This was a rare plant that I collected in Samoa in but one locality. When fresh it was pure white and a marked species, being so different from ordinary polyporoids. At that time I was not acquainted with any species of this group and was entirely at a loss to know where to place the plant. It is the only white Hexagona known in this section.

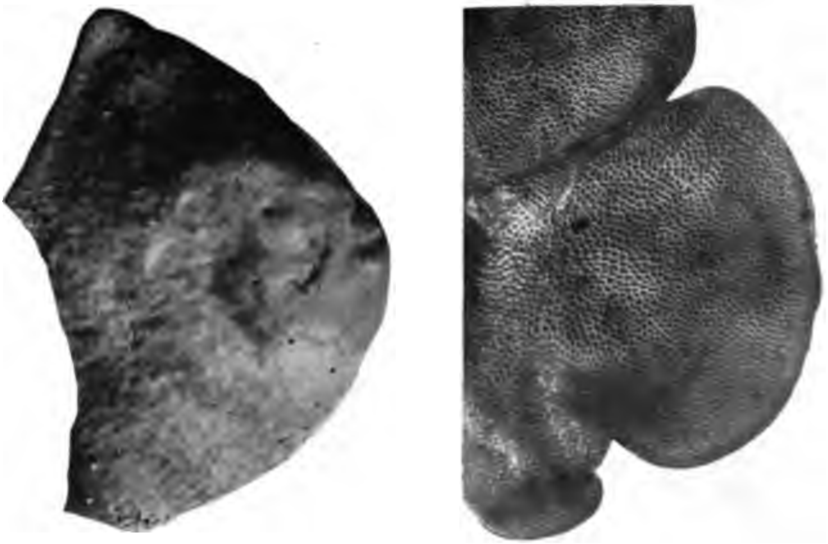

Fig. 329

Hexagona mirabilis. Photographed in Samoa.

SECTION 8, RESUPINATUS.

I believe there are no truly resupinate Hexagonas. The only one that has any claim is heteropora, and that is probably a resupinate form of something else. Some resupinate plants that have been named as Hexagonas, such as carbonaria and Bartlettii, are evidently so closely related to the ferruginous Porias that we shall so place them.

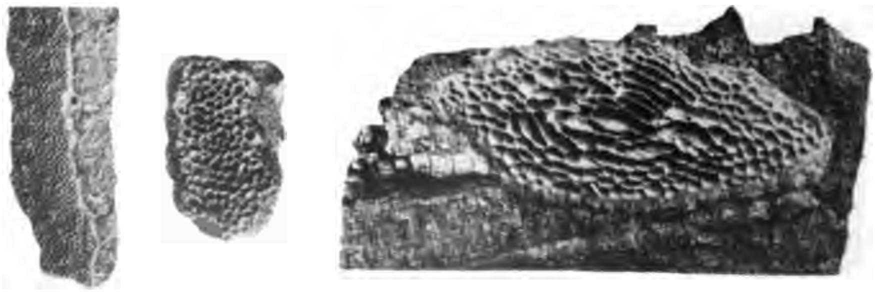

Fig. 330.

Hexagona heteropora. Types at Paris.

HEXAGONA HETEROPORA (Fig. 330).—Context pale. The remainder of the "description" can be made from our photograph. But three collections have been so named, which came from South America. We present photographs of all of them. The plant was named heteropora from the varying size of the pores, and it is evidently (from our figure) well named, if they are all the same species, which I doubt.

APPENDIX I.

NOMINA CONSERVANDA.

The following is an alphabetical list of the names of Hexagonas that we would "conserve." It does not have the formal sanction of our professional law-makers. but we think it has a better claim, namely, use, merit, and truth.

We give in addition to the name the country whence described, and as we think the name and country are the most important, we place them in heavy-face type. In lighter face type we summarize other details, viz.: the book citation, where published, and, what is more important, the museums where the type specimens are preserved. We also give what is of least importance of all, except to the parties concerned, the names of the wonderful discoverers.

ACULEATA—South America.—Ann. Sci. Nat. 2, vol. 13, p. 205. Montagne. Type, Museum at Paris.

AEQUALIS—South America.—Journ. de Bot., vol. 3, p. 258. Patouillard. Type in his herbarium.

ALBIDA—Philippines.—Jour. Linn. Soc., vol. 16, p. 47. Berkeley. Type at Kew.

AMPLEXENS—New Caledonia.—Bull. Soc. Myc. de France, vol. 18, p. 299. Patouillard. Type in his herbarium.

APIARIA—East Indies.—Voyage of Uranie, p. 169 (as Polyporus). Persoon. Type in museum at Paris.

ATROSANGUINEA.—Africa.—Engler's Jahrb., vol. 23, p. 545. Hennings. Type at Berlin.

BIPINDIENSIS—Africa.—Not published, as far as I know. Hennings. Type at Berlin.

CAPILLACEA—South America.—Bull. Soc. Myc. de France, vol. 4, p. 36. Patouillard. Type in his herbarium.

CHARTACEA—Africa.—Bull. Soc. Myc. de France, vol. 9, p. 209. Patouillard. Type in museum at Paris.

CONCINNA—Africa.—Bull. Soc. Myc. France, vol. 9, p. 209. Patouillard. Type in museum at Paris.

CUCULLATA—Cuba.—Ann. Sci. Nat. 2, vol 17, p. 125 (as Favolus). Montagne. Type in museum at Paris.

DESCHAMPSII—Ceylon.—Bull. Soc. Myc. France, vol. 7, p. 207. Hariot. Type in museum at Paris.

DISCOPODA—Africa.—Bull. Soc. Myc. France, vol. 9, p. 209. Patouillard. Type in museum at Paris.

DURISSIMA—Ceylon.—Jour. Linn. Soc., vol. 14, p. 57. Berkeley. Type at Kew.

DYBOWSKI—Africa.—Bull. Soc. Myc. France, vol. 8, p. 54. Patouillard. Type in museum at Paris.

ELEGANS.—Unknown, probably from Africa. Bull. Soc. Myc. France, vol. 7, p. 207. Hariot. Type in museum at Paris.

ERUBESCENS—Brazil.—Hooker's Jour. 1856, p. 237. Berkeley. Type at Kew.

GUNNII—Tasmania.—Flora of Tasmania, vol. 2, p. 255. Berkeley. Type at Kew.

HENSCHALLI—Java.—See page 11; not previously published. Berkeley. Type at Kew.

HETEROPORA—South America.—Jour. de Bot., vol. 3, p. 166. Patouillard. Type in museum at Paris.

HIRTA—Africa.—Flore d'Oware, p. 1, t. 1 (as Favolus). Palisot-de-Beauvois. Type at Geneva.

KURZII—India.—Trans. Linn. Soc., 2d ser., vol. 1, p. 126. Currey. Type at Kew, on sheet of polygramma.

LEPROSA—West Indies.—Nov. Symb., p. 101. Fries. Type in jar in museum at Upsala.

MACROTREMA—Java.—Nov. Symb., p. 101 (Junghuhn). Fries. Type in error in Box 42 of Persoon's herbarium at Leiden.

MIQUELII—South America.—Ann. Sci. Nat. 3, vol. 4, p. 357 (as Polyporus). Montagne. Type in museum at Paris.

MIRABILIS—Samoa.—Described on page 37. Type deposited at Kew.

NIAM-NIAMENSIS—Africa.—Engler's Jahrb., vol. 14, p. 348. Hennings. Type in museum at Berlin.

NITIDA—Algeria.—Sylloge, p. 170. Montagne. Type in museum at Paris.

OCHROLEUCA—India.—Ann. Sci. Nat. 3, vol. 5, p. 145 (as Sistrotrema). Léveillé. Type in museum at Paris. It is only a hexagonal form of a Lenzites.

PHAEOPHORA—China.—Bull. Soc. Myc., vol. 23, p. 74. Patouillard. Type in his herbarium.

POBEGUINI—Africa.—Bull. Soc. Myc. France, vol. 8, p. 28. Hariot. Type in museum at Paris. (Did not get in Saccardo's sweep net.)

POLYGRAMMA—Cuba.—Ann. Sci. Nat. 2, vol. 8, p. 365 (as Polyporus). Montagne. Type in museum at Paris.

PULCHELLA—Java.—Ann. Sci. Nat. 3, vol. 2, p. 200. Léveillé. Co-type in herbarium of Patouillard. It is only a small pored form of Hexagona tenuis.

RESINOSA—Philippines.—Bull. Torr. Club, vol. 35, p. 398. Murrill. Co-type in museum at Berlin.

RHOMBIPORA—South America.—Ann. Sci. Nat. 4, vol. 5, p. 370. Montagne. Type in museum at Paris.

RIGIDA—Pacific Islands.—Jour. Linn. Soc., vol. 16, p. 54. Berkeley. Type at Kew.

SACLEUXII—Africa.—Jour. de Bot., vol. 6, p. 19. Hariot. Type in museum at Paris.

SCUTIGERA—Brazil.—Elenchus Fung., vol. 1, p. 73 (as Polyporus). Fries. No type exists.

SEURATI—Pacific Islands.—Bull. Soc. Myc. France, vol. 22, p. 48. Patouillard. Type in his herbarium.

SIMILIS—Australia.—Hooker's Jour., 1846, p. 4. Berkeley. Type at Kew.

SPECIOSA—Africa.—Fungi Natalensis, p. 137. Fries. Type in a jar in museum at Upsala.

SUBTENUIS—India.—Not previously published. Berkeley. Type at Kew.

SULCATA—Ceylon.—Hooker's Jour., 1847, p. 510. Berkeley. There is no type at Kew, but a co-type in Montagne's herbarium, also one in that of Fries.

TENUIS—South America.—Kunth. Synopsis, vol. 1, p. 10 (as Boletus). Hooker. Type at Kew.

UMBRINELLA—Africa.—Fungi Natalensis, p. 137. Fries. Type in museum at Upsala.

VARIEGATA—Central America.—Proc. Amer. Acad., vol. 4, p. 122. Berkeley. There is no type so labeled, but there is no question that it is a specimen labeled Hexagona papyracea at Kew.

VELUTINA—Africa. Bull. Soc. Myc. France, vol. 9, p. 209. Patouillard. Type in museum at Paris.

VESPACEA—East Indies.—Voyage de Uranie, p. 170. Persoon. Only known from one little type in museum at Paris, another in Persoon's herbarium at Leiden.

APPENDIX II.

GEOGRAPHICAL DISTRIBUTION.

The real study of mycology, as I view it, is the study of species and their variations and the geographical distribution. Very little can be told of the geographical distribution at present, for much more abundant material will have to reach Europe before anything definite can be determined. We have arranged in the following tables the species found in the museums under nine geographical divisions, as follows:

No. 1, United States and Canada.
No. 2, Mexico, Central America, and West Indies.
No. 3, South America.
No. 4, Europe.
No. 5, Africa.
No. 6, India, Ceylon, and Malay Peninsula.
No. 7, Japan and China.
No. 8, Philippines and East Indies.
No. 9, Australia, New Zealand, New Guinea, and Pacific Islands.

The sign † indicates localities from which we have seen one or but a few specimens; if a number of collections it is indicated by a heavy face **C**; if the species is only known from the type collection, we indicate that fact with a star (*). Species that are very closely related and perhaps better called subspecies are indicated by being indented under what we consider the "type" form.

	United States. .	West Indies, etc.	South America. . .	Europe. . . .	Africa. . . .	India, etc. . .	Japan & China. .	East Indies, etc.	Australia, etc. .
Group 1, Setosus.									
Apiaria,		†				**C**		**C**	**C**
Deschampsii,						**C**			
hirta,					**C**				
capillacea,			*						
aculeata,			*						
elegans (probably),					*				
Henschalli,								*	
Dybowski,					*				

	UNITED STATES.	WEST INDIES, ETC.	SOUTH AMERICA.	EUROPE.	AFRICA.	INDIA, ETC.	JAPAN & CHINA.	EAST INDIES, ETC.	AUSTRALIA, ETC.
Group 2, Velutinus.									
variegata,		C	C						
scutigera,		C	C						
velutina,					†	†			
Group 3, Ungulaformis.									
nitida,				†	†				
Gunnii,									†
sulcata,						*			
durissima,						†		†	
resinosa,								*	
Group 4, Applanatus.									
Pobeguini,					C				
niam-niamensis,					*				
leprosa,		*							
speciosa,					*				
chartacea,					*				
Kurzii,									†
erubescens,			*						
amplexens,									*
Group 5, Tenuis.									
tenuis,		C	C		C	C		C	C
pulchella,								†	
polygramma,		C	C		C			C	
umbrinella,					C				
discopoda,					C				
subtenuis,						*			
phaeophora,						†			†
rigida,									C
similis,									*
atrosanguinea,					*				
Sacleuxii,					†				
Group 6, Pallidus.									
albida,									C
macrotrema.					†			†	†
vespacea,								*	
ochroleuca,						C		C	C
Seurati,									*
aequalis,			*						
rhombipora,			*						
Group 7, Pseudofavolus.									
cucullatus,	†	†							
Miquelii,		†	†					†	
bipindiensis,					†		†		
mirabilis,									*
Group 8, Resupinatus.									
heteropora,			*						

APPENDIX III.

SYNONYMS AND SPECIES IMPERFECTLY KNOWN.

The following is the list of specific names which we would refer to synonymy and our reasons for the same. We give also the countries from whence proposed, and the individuals responsible for them. We hold them responsible who published them, though in some cases the names were taken from and credit given to manuscript names. We also indicate a few manuscript names under which specimens are labeled in our principal museums. While of course a question in synonymy is largely a question of individual opinion, the following list (except in such cases as specially stated) is our conclusions as to authentic specimens examined. We have studied in the British Museum, the Museums of Kew, Paris, Berlin, and Upsala, which list embraces all the museums of Europe where much historic material is preserved, except the Java specimens at Leiden. We visited Leiden twice for this purpose, but both times found the Java specimens had been loaned. We would not pretend to publish as synonyms (as has recently been done) names that we have merely copied from others, nor would we perpetrate the fraud of pretending to pass upon specimens we never saw, and which in many cases do not exist. It is a fact well known to those who have investigated the subject that the usual description is a mere empty form. Plants can be recognized from systematic work in which those of a section or country are described by contrast, but it is impossible to describe a specimen as an isolated fact so that it can be surely recognized in one case out of a hundred. If the labels were removed from the type specimens in the museums I believe that not ten per cent of them could ever be replaced from anything that has been published about them, and I doubt if one per cent could. Under these conditions I feel it is useless to carry in our literature names and descriptions of specimens that do not exist. It is a part of the system of "science" to pretend to be able to judge from these descriptions as to the identity of the plants described, but I do not think that any one who has had experience really believes it (except in very exceptional cases), and I decline to subscribe to any such fiction.

If a plant has not acquired a name by use, or if it was not characteristically illustrated, and if authentic material does not exist in some museum or where it can be examined, there is little occasion to further encumber literature with it.

While the following list is specific names of plants placed in Hexagona, it does not follow they were all so placed by the authors stated. This may have been done by some one else, and who it was is immaterial and not worth recording. Nor does it follow that the species are all invalid in other genera where they belong, but not in my opinion in Hexagona.

Where we state "no type exists," we have been unable to find the type in the museum where it should be preserved, or authentic material in any other museum. We have made careful and systematic search, and taken time, and we believe the statements are literally true. Still we are aware there is always the possibility of the type turning up in some obscure place. Often we have found historic specimens in drawers or in cupboards, where the casual visitor would never think of looking.

The following is the list that we would refer to synonymy, and the reasons. We state also the name of the country whence described, and the names of the discoverers of these "new species." It is remarkable how many "discoveries" are made in "science," chiefly noteworthy from the fact that they are not true.

adelphica, Africa, Cooke=Hexagona hirta.

adnata, Ceylon, Berkeley=an anomaly of some kind.

affinis, Pacific Islands, (Published?) Berkeley=Hexagona tenuis.

arata, Pacific Islands, Berkeley. It is not a Hexagona, but a Polyporus related to gilvus.

auriculata, United States, Patouillard. Specimen not found for me, but I have little doubt it is Hexagona cucullata, which is the only species we have in the United States, I think.

Bartlettii, South America (Published?), Massee. Better classed as a ferruginous Poria related to contigua.

Blumei, Java, Léveillé. No type known to me.

Boneana, Africa, Patouillard. Too close to umbrinella.

brevis, Ceylon, Berkeley. No type exists.

Burchelli, Mss.=umbrinella.

carbonaria, United States, Berkeley. Better classed as a ferruginous Poria, close to contigua.

Casuarinae, New Caledonia, Patouillard=Hexagona tenuis.

cervino-plumbea, Java, Junghuhn=Hexagona tenuis.

Cesatii, Borneo, Cesati=Hexagona albida, a little cyclomycoid.

ciliata, Philippines, Klotzsch=Polystictus versatilis.

cingulata, West Indies, Léveillé. No type known to me.

crinigera, Africa, Fries=Hexagona hirta.

cladophora, Philippines, Berkeley. Not a Hexagona for me. A better Trametes.

Cookei, New Guinea, Saccardo. Change of Hexagona favoloides of Cooke, which being Hexagona albida, the change was not necessary.

coriacea, Brazil, Berkeley. Type inadequate to judge.

crassa, Africa, Léveillé=Hexagona hirta.

cruenta, South America, Montagne=Trametes Persoonii.

cyclophora, African island, Léveillé. No type exists.

decipiens, Australia, Berkeley. For me not a Hexagona. It has colored spores and is a better Polyporus.

dermatodes, Philippines, Léveillé. It is a Polystictus-Trametes.

discolor, Australia, Fries. No type exists.

Dregeana, Africa, Léveillé=Hexagona umbrinella.

fasciata, Pacific Islands, Berkeley. No type exists.

favoloides, Central America, Peck=Hexagona tenuis.

favoloides, New Guinea, Cooke=Hexagona albida.

favus, China, Linnaeus. No type exists. Supposed to be Hexagona apiaria.

flabelliformis, Philippines, Berkeley. Type material inadequate.

Friesiana, South America, Spegazzini=Polystictus villosus.

glabra, Africa, Palisot. No type is said to exist, but there is a good picture. Probably the same as Hexagona umbrinella.

glabra, India, Léveillé. A hexagonal form of Lenzites ochroleucus.

gracilis, Brazil, Berkeley. Belongs to a section of Polyporus.

inconcinna, Philippines, Berkeley (as Daedalea)=Hexagona albida.

induratus, West Indies, Berkeley=Hexagona Miquelii.

intermedia, Australia, Berkeley (as Daedalea)=Hexagona albida.

Klotzschii, Africa, Berkeley=Hexagona hirta.

Koenigii, Ceylon, Berkeley=effete Hexagona apiaria.

laevis, Pacific Island, Cooke, nondescript.

lurida, Java, Léveillé=Hexagona glabra.

Marcucciana, Italy, Baglietto=Hexagona nitida.

Molkenboeri, Java, Léveillé=Hexagona macrotrema, and based on same collection.

Mori, Italy, Marcucci (as Favolus)=Hexagona nitida.

Muelleri, Australia, Berkeley. Too close to Hexagona rigida.

nigro-cincta, Pacific Island, Patouillard=pale form of rigida.

orbiculata, Africa, Fries=Hexagona tenuis.

obversa, Africa, Patouillard. Too close to chartacea.

pallens, Mexico, Saccardo. Unknown to me

pallida, African Islands, Schröter. Unknown to me.

papyracea, locality unknown, Berkeley=Hexagona variegata.

peltata, Africa, Fries. No type exists.

pergamenea, Ceylon, Berkeley. Not a Hexagona. Close to Polystictus dermatodes.

picta, East Indies, Berkeley. Type inadequate.

pustulosus, Java, Léveillé=Hexagona Miquelii.

sericea, United States, Fries=Polystictus villosus.

sericeo-hirsuta, United States, Klotzsch (as Polyporus)=Polystictus villosus.

sinensis, Africa, Klotzsch=Hexagona hirta.

sinensis, China, Fries. In reality merely a change of name of Boletus favus, of which no type exists. Fries states "v. s.," but the specimen he saw was from Klotzsch and was Hexagona hirta.

strigosa, Africa, (Mss. name) Cooke=Hexagona hirta. It was published as Trametes adelphica.

Stuhlmanni, Africa, Hennings=Hexagona Pobeguini.

subaculeata, Borneo, Cesati. Unknown to me.

subrigida, Philippines, Murrill. Unknown to me.

tabacina, Java, Léveillé Not a Hexagona, but the same as Polystictus cichoriaceus. Léveillé also discovered the same plant was another "new species" in another genus and called it Polyporus fuscus, but little matters of this kind did not bother Léveillé.

Taxodii, United States, Murrill=Hexagona cucullata, teste the author.

Thollonis, Africa, Patouillard. Unknown to me. Type is at Brussels, but not seen by me.

Thwaitesii, Japan, Berkeley=Hexagona tenuis. Thwaite collected in Ceylon, and had nothing to do with this plant from the island of Bonin. Why it was named after him I do not know.

tricolor, Africa, Fries. No type exists. From the description I think it is the same as Hexagona discopoda.

unicolor, Africa, Fries. No type exists.

velutina, China (published?), Patouillard=Hexagona bipindiensis.

versicolor (ascribed to Fries). No such plant was named or published, which, however, did not prevent Spegazzini from so determining specimens.

vitellina, Borneo, Cesati. Unknown to me, but I have not much faith in there being a yellow Hexagona.

vittata, Central America, Ellis=Polystictus villosus.

Welwitschii, Africa, Smith=Hexagona Pobeguini.

Wightii, India, Klotzsch=Hexagona apiaria, but in the museums mostly known under this name.

Note.—There is a variation in the spelling of the generic name. Some spell it Hexagona, others Hexagonia.

INDEX TO THE SPECIES OF HEXAGONA.

Those marked with a star (*) are perhaps better called sub-species or varieties or are of minor importance.

Aculeata 9
Aequalis* 33
Albida 29
Amplexens 22
Apiaria 6
Atrosanguinea 27
Bipindiensis 36
Capillacea 8
Chartacea 20
Concinna* 26
Cucullata 35
Deschampsii 9
Discopoda* 26
Durissima* 16
Dybowski 11
Elegans 9
Erubescens 21
Gunnii 15
Henschalli 11
Heteropora 39
Hirta 7
Kurzii 21
Leprosa 20
Macrotrema* 30
Miquelii 36
Mirabilis 37
Niam-niamensis 18
Nitida 14
Ochroleuca 31
Phaeophora* 26
Pobeguini 17
Polygramma* 25
Pulchella* 25
Resinosa 16
Rhombipora* 34
Rigida 26
Sacleuxii 27
Scutigera* 13
Seurati 33
Similis* 27
Speciosa 21
Subtenuis* 26
Sulcata 15
Tenuis 23
Umbrinella* 26
Variegata 12
Velutina* 14
Vespacea* 33

BULLETIN NO. 15. 1911. BOTANY SERIES, NO. 1.

BULLETIN
of the
LLOYD LIBRARY
of
BOTANY, PHARMACY AND MATERIA MEDICA

J. U. & C. G. LLOYD
CINCINNATI, OHIO

BOTANY SERIES, No. 1

Catalogue
of the
Ferns and Flowering Plants
of
Cincinnati, Ohio, and Vicinity.

By W. H. AIKEN
Curator of Botany of the Lloyd Library and Museum

Publications Issued by The Lloyd Library

(Complete List to January 1, 1911.)

Bulletin of the Lloyd Library of Botany, Pharmacy, and Materia Medica

No. 1. Reproduction Series No. 1.
Collections for an essay towards a Materia Medica of the United States by Benjamin Smith Barton, 1798 and 1804.

No. 2. Reproduction Series No. 2.
The Indian Doctor's Dispensatory, being Father Smith's advice respecting diseases and their cure, by Peter Smith, of the Miami Country, 1813.

No. 3. Mycological Series No. 1.
The Genera of Gastromycetes, by C. G. Lloyd.

No. 4. Pharmacy Series No. 1.
References to Capillarity to the end of the year 1900, being Chapter VII of "A Study in Pharmacy," by John Uri Lloyd.

No. 5. Mycological Series No. 2.
The Geastrae, by C. G. Lloyd.

No. 6. Reproduction Series No. 3.
Materia Medica Americana, Potissimum Regni Vegetabilis, by Johannes David Schoepf, 1787.

No. 7. Reproduction Series No. 4.
An account of some of the vegetable productions naturally growing in this part of America, botanically arranged by the Rev. Manasseh Cutler.

No. 8. Mycological Series No. 3.
The Lycoperdaceae of Australia, New Zealand, and Neighboring Islands, by C. G. Lloyd.

No. 9. Reproduction Series No. 5.
An investigation of the properties of the Sanguinaria Canadensis or Puccoon, by William Downey.
Travels through the interior parts of North America in the years 1766, 1767, and 1768, by J. Carver.
Libellus de Usu Medico Pulsatillae Nigricantis.

No. 10. Reproduction Series No. 6.
Hydrastis Canadensis.

No. 11. Reproduction Series No. 7.
Life and medical discoveries of Samuel Thomson and a history of the Thomsonian Materia Medica.

No. 12. Pharmacy Series No. 2.
The Eclectic Alkaloids, Resins, Resinoids, Oleo-Resins, and Concentrated Principles, by John Uri Lloyd.

No. 13. Mycological Series No. 4.
Synopsis of the Known Phalloids, by C. G. Lloyd.

No. 14. Mycological Series No. 5.
Synopsis of the Genus Hexagona, by C. G. Lloyd.

No. 15. Botany Series No. 1.
Catalogue of the Ferns and Flowering Plants of Cincinnati, Ohio, and Vicinity, by W. H. Aiken.

Bibliographical Contributions from the Lloyd Library

No. 1. Catalogue of the Periodical Literature in the Lloyd Library.

Mycological Writings of Mr. C. G. Lloyd

Mycological Notes, No. 1 to No. 36, 1898-1910.
Mycological Notes, Old Species Issue, No. 1, 1908.
Mycological Notes, Polyporoid Issue, No. 1 to No. 3, 1908-1910.
Letters, No. 1 to No. 28, 1904-1910.
A Compilation of the Volvae of the United States, 1898.
The Genera of the Gastromycetes, 1902.*
The Geastrae, 1902.*
The Lycoperdaceae of Australia, New Zealand, and Neighboring Islands, 1905.*
The Tylostomeae, 1906.
The Nidulariaceae, 1906.
The Phalloids of Australasia, 1907.
Synopsis of the Known Phalloids, 1909.*
Synopsis of the Genus Hexagona, 1910.*
Synopsis of the Sections Microporus, Tabacinus, and Funales of the Genus Polystictus, 1910.

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* Published also as a Bulletin of the Lloyd Library of the Mycological Series.

HISTORICAL

The first attempt towards the tabulation of plants growing in the immediate vicinity of Cincinnati was that which was made and published by Dr. Daniel Drake in 1815. In this list nothing further was attempted than a catalog of the forest trees, and such herbaceous plants as were deemed useful in medicine and the arts. There were 99 species mentioned belonging to 59 genera, and several undetermined species.

In 1835 a second list was published by Dr. John Riddell, entitled, A synopsis of the Flora of the Western States, and supplemented in 1836 by a list of additions of Ohio plants discovered within the State. This catalog and descriptions were read, and specimens exhibited before the Western Academy of Natural Sciences, March 16, 1836. It contains many notes of Hamilton County flora. A portion of Dr. Riddell's collections was in the herbarium of Marietta College.

While Dr. Riddell was at work in Cincinnati, another very eminent botanist was also collecting here; that was Mr. Thos. G. Lea. His collections were made between 1834 and 1844, and published after his death by his brother in 1849. This collection of plants is now in the Philadelphia Academy of Sciences. It named nearly 1,150 species of plants, including about 698 species of Phaenogams belonging to 353 genera, and 515 species of Cryptogams belonging to 167 genera.

The work of identifying the collection was divided between W. S. Sullivant, who arranged the Phaenogams, Mosses, and Hepatics; Ed. Tuckerman, the Lichens; and the eminent fungologist, M. J. Berkeley, the fleshy and woody fungi.

Three years after the appearance of the Lea catalog another collection was made in the vincinity of Cincinnati by Joseph Clark, and a list made of the same, entitled, "A Catalog of Flowering Plants and Ferns Observed in the Vicinity of Cincinnati." This list was adopted and published by the Western Academy of Natural Sciences in 1852. This catalog was not as extensive a one as the Lea list of plants; it numbered 368 genera and 686 species. The compiler of the catalog, Joseph Clark, was a native of Scotland, and a resident of Cincinnati from the year 1823 until his death at the age of seventy-six years, which event occurred in this city July 1, 1858. At his death his extensive cabinets and herbarium—for he was a lover of nature and an indefatigable collector of specimens—passed into the hands of a relative, and were at length deposited in what was known as the Cincinnati Female Seminary. It was not many years before this college, which was the property of Dr. G. N. Maxwell, was burned to the ground and the entire collection destroyed.

At the end of the Clark catalog appears an appendix of ninety-five species, which was furnished by Robert Buchanan. Mr. Buchanan has written as follows: "At the request of Mr. Clark I have examined the foregoing catalog, and have made the following additions to it. Many of these plants were in his own collection, but were not inserted for want of time to revise the list."

A fifth list was made by Miss Rachel L. Bodley, who was at one time the teacher of Natural Sciences in the Cincinnati Female Seminary. This list was published thru the generosity of her brother, Joseph T. Bodley, Aug. 1, 1865. In this catalog the plants which belong to the Cincinnati flora are starred and include a number which are not in Mr. Clark's catalog.

The sixth list which appeared was made by Joseph F. James from personal observations, and from the catalogs of Messrs. Lea and Clark. This was printed in the Journal of the Cincinnati Society of Natural History, April, 1879. This catalog records 899 plants, and includes within its scope the Lea list of fungi. The author of this catalog, Joseph F. James, was born in Cincinnati, Ohio, February 8, 1857. At an early age he displayed a great desire for a knowledge of scientific subjects. He was fortunate in having a father with like tastes, capable of guiding him. At the age of sixteen our local catalog was made—the one from which we have so often quoted—and published by the Cincinnati Society of Natural History. In 1881 he was appointed custodian of this society, a position which he held for six years. He also became professor of medical botany in the Cincinnati College of Pharmacy. In the earlier years of his career his interests and work were mainly in the field of Botany.

In 1884 he was married to Sarah C. Stubbs, of Cincinnati, who had been a teacher of botany and physiology in the city High Schools.

In 1891 he received an appointment in the United States

Department of Agriculture as an assistant vegetable pathologist, and in this capacity he served for four years. In 1895 he graduated at the medical school of Columbia University, and after a winter of hospital work and bacteriologic study in New York and London, began practice in Hingham, Mass. In this city he died, March 29, 1897.

The catalog of Joseph F. James was made more valuable thru the publication of corrections and additions furnished by his brother, Mr. Davis L. James. This pamphlet was printed in the Journal of the Cincinnati Society of Natural History, January, 1881. In this publication Mr. James acknowledges his indebtedness to Dr. J. H. Hunt for specimens and information. and also special mention to Mr. T. W. Spurlock, Dr. R. M. Byrnes, Dr. H. H. Hill, and Miss Kate Peachey, of Loveland. And to make the catalog still more complete, Mr. C. G. Lloyd furnished a transcript of his notes upon our flora, adding nineteen new species and sixteen new identifications.

At about the time that this botanical activity was at its height at the Natural History Society, there was being brought together in this city one of the most extensive private collections in the West. We refer to the collection of Mr. C. G. Lloyd, made from 1880 to 1890. The following is an approximate résumé of the collection:

Plants of Gray's Manual, 4,800 specimens; Southern States, 1,500; Western States and Texas, 3,300; Germany, 3,400; Austria and Switzerland, 2,400; England, 1,200; France, 1,500; Norway and Sweden, 750; Italy, 300; Australia, 900; New Zealand, 600; Carices of Europe, 600; miscellaneous countries, 300; cultivated plants, 150. These specimens are now in the Lloyd Museum. As they were all obtained by exchange of local specimens, the plants of Cincinnati are widely represented in the collections throughout the world.

In 1891 Mr. Lloyd published a List of Plants observed growing wild in the vicinity of Cincinnati, Ohio. This list, together with the herbarium specimens accompanying the same, was the source of our information, which proved so valuable in the compilation of the present list.

The next student of the flora of Hamilton County who issued a catalog was Walter H. Aiken, the supervisor of music of the Cincinnati schools. His check list was issued by the Society of Natural History in 1905. Shortly after the publication of this catalog his entire herbarium of Phaenogams and Cryptogams became a part of the Lloyd Herbarium. Since 1908 the herbarium has increased considerably thru the addition of valued material from eminent botanists in the West and South.

It has been our endeavor to make this catalog accurate and authorative of all plants growing wild in the vicinity of Cincinnati. We included cultivated plants only when they have become well enough established to form a part of our flora.

We deeply appreciate the services of Miss Lucy Braun, of the Cincinnati University, for her critical notes and specimens; also Miss Henrietta Walter, for so many years a teacher in Woodward High School, for her notes upon specimens which had come under her observation; and to Mr. Max Braam, of Hughes, for the privilege of examining so many herbariums of pupils. Without the assistance of such workers this catalog would not have been possible.

The unfortunate and conflicting opinions that exist as to the names of plants, make the adoption of any one authority undesirable. In every instance we have adopted the name for the plant according to our best judgment, and in the main, and unless otherwise stated, we have taken that given in the last edition of Gray's Manual, this being in keeping with the botanical uses of the leading institutions of the world. We have not added names of authorities to plant names, as we consider it useless where we state the source of our names.

Walter H. Aiken,
Cincinnati, Ohio.

January, 1911.

CATALOGUE

OF THE

Ferns and Flowering Plants

Of Cincinnati, Ohio, and Vicinity

Division 1.

Pteridophyta, Ferns and Fern Allies

OPHIOGLOSSACEAE.

Botrychium obliquum.

We gathered this plant on a knoll near the end of the old College Hill narrow gauge railroad. Rare. Specimen in the Herbarium.

Botrychium dissectum.

Reported in the catalog of Joseph F. James by Mr. S. T. Carley, but not heard from since. We would be glad to receive a specimen. To be looked for in damp pastures.

Botrychium virginianum.

Common throughout the county, especially in rich, moist woods.

Ophioglossum vulgatum. Adder's tongue.

Reported by Prof. John Hussey, 1879.

OSMUNDACEAE.

Osmunda cinnamomea. Cinnamon fern.

Seen in cultivation but not wild. This plant was reported as growing wild near Cincinnati by Joseph Clark in his catalog of plants published in 1852.

Osmunda Claytoniana. Clayton's fern.

Gathered by Mr. A. G. Weatherby; also Mr. T. W. Spurlock, reported in 1879. A specimen from this county is in the Ohio State University Herb. We have seen it growing here in cultivation.

Osmunda regalis. Royal fern.

Reported by Mr. S. T. Carley. Specimen from Cincinnati at Columbus, Ohio, in University. In cultivation at Cincinnati.

POLYPODIACEAE.

Onoclea sensibilis. Sensitive fern.

Reported by Mr. C. G. Lloyd as growing in the vicinity of Cincinnati 1891. To be looked for in wet places.

Cystopteris bulbifera. Bladder fern.

Not likely to be found growing wild. Fern hunters have probably destroyed the last frond of it. Nearly all catalogs have reported its presence here.

Cystopteris fragilis. Brittle fern.

A large patch of this was seen lately near Mt. Healthy. The specimen in our herbarium came from that locality.

Aspidium Goldieanum.

Quite common in cultivation; brought to Cincinnati by those who go to Michigan and Northern Ohio for summer vacations. It is questionable whether this fern ever grew wild in the Southern part of Ohio.

Aspidium marginale.

Grows with A. Goldieana in cultivation. Often brought into school rooms. Said to be growing wild in Hamilton County in 1852.

Aspidium spinulosum intermedium.

Not seen outside of cultivation. There is a specimen in the herbarium of the State University from Hamilton County.

Aspidium thelypteris.

Gathered by Mr. C. G. Lloyd, 1890. The draining of all wet places in the neighborhood of Cincinnati have made this species very scarce. It is reported as belonging to our flora by Joseph F. James.

Polystichum acrostichoides. (Aspidium.)

This plant was growing a year ago near a pile of rocks in an old orchard. It has probably been destroyed by this time. Rare, except in cultivation. We have a specimen gathered in College Hill.

Phegopteris hexagonoptera. Beech fern.

This is found oftener than any other fern growing wild in the county unless it be Botrychium virginianum.

Phegopteris polypodiodes.

A specimen of this fern is in the Ohio State Herbarium, sent from Hamilton County. We have never gathered it nor seen it growing in the woods or fields.

Camptosorus rhizophyllus. Walking leaf.

Probably does not occur outside of ferneries.

Asplenium angustifolium.

We found this growing sparingly "Up where the sun shines" several years ago (1905). A specimen is in the herbarium.

Asplenium filix-foemina.

Reported in the James catalog as growing in the vicinity of Cincinnati (1882). Probably now in cultivation only. Fronds are quite variable.

Asplenium acrostichoïdes.

Reported in the James catalog; also a specimen in the Lloyd herb. under date of June 24, 1883. No locality mentioned except Hamilton County.

Asplenium trichomanes. Maiden hair spleenwort.

Found at Delhi, some thirty years ago, by Dr. Rofelty. This is the only station known.

Adiantum pedatum. Maiden hair fern.

To be met with occasionally, growing wild. It has too many admirers to enjoy that privilege. Lloyd, July 1, 1883; Aiken, 1895.

Pteris aquilina. Brake, Bracken.

Reported in the catalog of Clark. Frequent in cultivation.

Polypodium polypodioides.

This was growing some years ago near Batavia Junction. Altho it was rare even then, it is possible that it may still be growing there. Specimen at Columbus, Ohio, State Herbarium.

Polypodium vulgare. Common polypody.

This fern that comes into the schools so frequently, probably grows only in cultivation. If a wild habitat is known, we would be glad to be advised of it. It is to be looked for on rocky banks, and occasionally, in swamps, on trunks of trees.

SALVINIACEAE.

Azolla caroliniana.

There is a specimen in the Herbarium of the Ohio State University, from Hamilton County. In appearance it is somewhat like a reddish hepatic moss. It is to be looked for on quiet ponds.

EQUISETACAE.

Equisetum arvense. Common horse-tail.

Grows quite plentifully, east of the city, along roadsides. Collected by C. G. Lloyd and W. H. Aiken.

Equisetum sylvaticum. Wood horse-tail.

Reported by Mr. J. L. Taylor. To be looked for in moist woods. Rare.

Equisetum fluvitale.

This is Equisetum limosum, reported by James. Found in shallow water and mud banks. Rare.

Equisetum hyemale.

Plant collected by Miss Marie Mohr. We have never found it.

Division 2.

Spermatophyta, Seed Plants, Phanerogamia, or Flowering Plants.

TYPHACEAE.

Typha latifolia. Broad leaf Cat-tail.

To be found growing in some marshy places. Specimen in herbarium.

Typha angustifolia. Narrow leaf Cat-tail.

Reported by Miss Lucy Braun, 1910. Rare. Found also in Licking County.

SPARGANIACEAE.

Sparganium americanum.

Reported as growing in Chester Park lake, in 1884, by Dr. R. M. Byrnes. The Clark catalog mentions Sparganium ramosus as belonging to our flora. We have never seen a specimen growing here.

NAIADACEAE.

Potamogeton foliosus.

This is the Potamogeton pauciflorus listed in the James Catalog, reported as having been found here in still waters.

Potamogeton natans.

Our specimen came from Emerson's pond, College Hill. This is our commonest species.

Potamogeton pectinatus.

There is a specimen of this plant in Ohio State University Herbarium, from Hamilton County.

Zannichellia palustris.

There is a specimen of this in the Ohio State University, from Hamilton County. It has not been reported, to our knowledge, of late years. It is to be looked for on ponds and slow streams, chiefly brackish.

ALISMACEAE.

Alisma plantago-aquatica. Water plantain.

Quite common in swamps.

Saggitaria latifolia. Arrow head.

Common. Growing in the Canal near Northside. Exceedingly variable as to leaf contour.

Echinodorus cordifolius.

Found by Miss Lucy Braun, 1910.

HYDROCHARITACEAE.

Elodea canadensis. Water weed. Ditch moss.

Our specimen was brought fresh to the herbarium. It was gathered at the Eden Park reservoir.

GRAMINEAE.

Andropogon scoparius. Broom beard grass.

Specimen in the Ohio State University, from Hamilton County. Rare.

Andropogon furcatus.

This is the plant which is so abundant on the prairies of the West, known as bluestem. It has been reported as growing near Cincinnati.

Sorghum Halepense. Johnson grass.

No. 569 of "List of plants observed growing wild in the vicinity of Cincinnati," appears Andropogon sorghum Boot. var. Halepensis Hack. There is a specimen in the Lloyd herb., identified by Prof. F. L. Scribner.

Sorghastrum nutans. Indian grass. Wood grass.

This is in the James catalog under the name Sorghum nutans.

Paspalum laeve. Field Paspalum.

Herbarium label marked August 8, 1887 (F. L. Scribner). This grass has come into the herb. several times since. To be looked for on grassy banks.

Paspalum setaceum. Slender Paspalum.

No. 555 of the Lloyd catalog; also collected by W. H. Aiken. Easily recognized by its soft, hairy leaves, and generally solitary spikes.

Digitaria sanguinalis. Crab grass.

This is the Panicum sanguinale of Linnæus, appearing in the flora of Britton and Brown, as Syntherisma sanguinalis. The grass is widely distributed as a weed thruout the county, especially in cultivated grounds.

Digitaria humifusa. Small Crab grass.

Panicum glabrum is the name under which this appears in the herb. Our specimen was gathered September 16, 1890, and submitted to Prof. Scribner for naming. He wrote that our specimen was taller, more slender, and the spikes rather longer than usual. It was a form intermediate between the species and Dr. Gattinger's Mississippiense.

Echinochloa Crus-galli. Barnyard grass. Cockspur grass.

Very common thruout the county. Cattle and horses are very fond of it.

Panicum capillare. Old witch grass.

Common everywhere. Weed. September 16, 1890. Fond of dry soil.

Panicum clandestinum.

We gathered this grass—1905. Specimen in the herb. Growing near Mt. Healthy, in an open, swampy woods. Rare.

Panicum dichotomum.

Collected by D. L. James, 1882. C. G. Lloyd, June 10, 1890; also W. H. Aiken, 1905. Branches at the top like a little tree.

Panicum depauperatum. Starved panicum.

Reported by D. L. James, 1882.

Panicum latifolium.

D. L. James, 1882; C. G. Lloyd, June 14, 1890. This is our widest leaf Panicum. It is common in the woods of College Hill.

Panicum linearifolium.

Prof. W. A. Kellerman thought that this name should be given to the specimen sent to him. Slender, erect culm, drooping at the summit. We had sent it to him as Panicum depauperatum. It grew quite plentifully, several years ago, at the edge of the woods, back of the Military School, College Hill.

Panicum proliferum.

This appears in the seventh edition of Gray as Panicum dichotomiflorum Mx. It is a coarse, succulent grass that appears about drains or low waste places.

Panicum virgatum. Switch grass.

We sent this to the Ohio State University. There is a specimen in our herbarium. It grows from creeping rootstalks.

Setaria glauca. Foxtail pigeon grass.

Common. The bristles upwardly scabrous.

Setaria italica. Millet.

Usually found growing in any field where it has ever been cultivated.

Setaria verticillata.

Common everywhere. The bristles are downwardly barbed and easily recognized. It seems to have appeared within the past ten years.

Setaria viridis. Green foxtail, Bottle grass.

Waste places everywhere. Bristles slender, upwardly barbed.

Cenchrus tribuloides. Hedgehog, Bur grass.

First appeared along the O. and M. railroad, near Sedamsville. Our specimen was gathered at College Hill.

Zizania aquatica. Indian rice, Water oats.

This is No. 814, of the James catalog, where the plant is recorded as having been found by Mr. T. W. Spurlock.

Leersia oryzoides. Rice cut grass.

Usually to be found in wet places and along streams; the panicle branches are generally lax. Specimen in herb.

Leersia virginicus. White grass.

Thrives in damp, shady places. Common. Panicle branches, rigid.

Phalaris arundinacea. Reed Canary grass.

No. 571, of the Lloyd catalog, (1891). Moist or wet soil. The ribbon grass—green and white—of cultivation, is a variation of this species. It is sometimes seen as an escape from gardens.

Phalaris canariensis. Canary grass.

Reported, 1882, as appearing occasionally about barns. The grass does not seem to persist long in any one place.

Anthoxanthum odoratum. Sweet Vernal grass.

No. 572, of the Lloyd catalog. We collected it in a lawn at College Hill and have also seen it growing in fields.

Aristida gracilis. Slender Aristida.

Gathered by Mr. C. G. Lloyd; also W. H. Aiken.
The middle awn of this species is straight.

Aristida oligantha.

Reported by Miss Lucy Braun.

Aristida purpurascens.

Reported by W. H. Aiken; found a mile north of College Hill, along the railroad track. A specimen sent to the Agricultural Experiment Station; also Columbus State University.

Muhlenbergia diffusa. Nimble Will, Dropseed grass.

Common in woods. Specimen Herb identified by Prof. Scribner.

Muhlenbergia mexicana.

Borders of fields and damp ground. Herb, specimen gathered passed thru the hands of Prof. Scribner.

Brachyelytrum aristatum.

An addition to our Hamilton County Flora. Plant found by Miss Lucy Braun.

Phleum pratense. Timothy.

Widely cultivated for hay in Hamilton County. Also grows wild.

Alopecuris pratensis. Meadow fox-tail.

This grass is reported in Clark's catalog as growing here. We have never seen it growing wild. Possibly it may be found in cultivation. It is said to make an excellent pasture grass.

Sporobolus vaginaeflorus.

Under 577, of the Lloyd catalog, we find the following note: Your Sporobolus vaginaeflorus Vasey, is Vasey's var. tenuior. The spikelets approach those of Sporobolus asper, and this, together with its nearly erect habit, runs it very close to that species.—Scribner. The grass grows along roadsides in poor soil.

Cinna arundinaceae.

Given in the James and Lloyd catalog. To be looked for in swampy places.

Agrostis alba. Herd's grass.

Found in grass lands.

Agrostis perennans. Thin grass.

Grows in woodlands. Panicle usually light green, sometimes purplish.

Agrostis scabra. Rough Hair grass.

This is reported in Clark's catalog; also C. G. Lloyd, No. 581. We have never seen it growing in Hamilton County. It is to be looked for in damp, shaded places.

Avena sativa. Oats.

Species of the cultivated oats are often seen in waste places, in fields where it has been cultivated. Also along roadsides.

Arrhenatherum avenaceum. Oat grass.

Has been growing quite plentifully back of the Ohio Military School, College Hill. Culms from two to three feet high.

Danthonia spicata. Wild oats.

Common. Our specimens are of the pubescent type.

Spartinia cynosuroides. Tall marsh grass.

Fond of brackish water. Herb specimen collected by C. G. Lloyd, July 22, 1890.

Elusine indica. Wire grass, Crab grass.

Common in dooryards, waste places, everywhere.

Triodia cuprea. Tall red top.

Common thruout the county, in fields.

Eragrostis capillaris.

Reported in the Clark catalog. We have not collected it in this county.

Eragrostis Frankii. Frank's eragrostis.

No. 589, of the Lloyd catalog. College Hill specimens were sent to the Agricultural Experiment Station, at Wooster, Ohio; also to the Ohio State University Herb.

Eragrostis reptans. Creeping eragrostis.

Collected by C. G. Lloyd, No. 587. Common in sandy soil.

Eragrostis major. Strong-scented eragrostis.

C. G. Lloyd, No. 588. A handsome grass.

Eragrostis pectinacea. Purple eragrostis.

Reported by C. G. Lloyd, No. 591. This grass does not seem to have been observed before 1890, in this part of the State.

Eragrostis pilosa. Tufted eragrostis.

Reported in the James catalog, 1879. Not collected of late years.

Eragrostis Purshii. Pursh's eragrostis.

C. G. Lloyd catalog (1890), No. 590.

Eatonia pennsylvanica.

Reported in the James catalog, by Mr. T. W. Spurlock, (1879). C. G. Lloyd, 1890.

Diarrhena americana.

Clark's catalog, 1852. Miss Lucy Braun, 1910.

Uniola latifolia. Spike grass.

Clark's catalog, 1852. Miss Lucy Braun, 1910.

Dactylis glomerata. Orchard grass.

Common everywhere. No. 591, C. G. Lloyd.

Cynosurus cristatus. Dog's-tail grass.

An adventive from Europe. New to our Hamilton County Flora. Found by Miss Lucy Braun, 1910.

Poa annua. Annual Meadow grass.

Common in dooryards, lawns and waste places. Specimen in Herb.

Poa compressa. Wire-grass, English bluegrass.

Common. The variety which we have noticed growing in woods seems to be of a more slender form. No. 594, of Lloyd collection.

Poa pratensis. Kentucky bluegrass.

Probably the commonest grass which grows in the Northern and Central United States. Our lawns are largely formed of this species.

Poa sylvestris.

Common in woodlands. The branches of the panicle are often bent downward when old. No. 596, Lloyd collection.

Glyceria nervata. Nerved manna grass.

No. 597, of the Lloyd catalog. To be looked for in wet woods.

Festuca elatior. Tall Fescue.

Reported by C. G. Lloyd, No. 598.

Festuca nutans. Nodding Fescue grass.

Damp woods. There is a specimen at Columbus, State University, sent from this county.

Festuca ovina. Sheep's Fescue grass.

Reported by Miss Lucy Braun, 1910.

Bromus ciliatus purgans. Soft chess or cheat.

This is our commonest Brome grass. Grows in woods and thickets.

Bromus racemosus. Upright cress.

James catalog, 1879.

Bromus secalinus.

No. 599, of the Lloyd collection. A pest in grain fields when it occurs.

Bromus tectorum.

Reported by Miss Lucy Braun.

Lolium perenne.

This was first found by Mr. D. L. James, growing in Avondale, 1882. It is now common all over the county.

Hordeum jubatum. Squirrel-tail grass.

We have seen this growing at Linwood. We have gathered it near Mt. Healthy. A specimen is in the herbarium from the latter locality.

Hordeum pratense.

Specimen in the Herb. at the Ohio State University, from Hamilton County.

Elymus canadensis.

No. 608, of the Lloyd collection. Common.

Elymus striatus.

Has been known to be growing in the vicinity of Cincinnati for 75 years.

Elymus virginicus.

This is the species with the large and stout spike. Common.

Asprella hystrix.

This is a perennial. Common in thickets about Cincinnati.

CYPERACEAE.

Dulichium spathaceum.

Reported in the Lea catalog, 1849; and Clark, 1852. Grows in swampy places. Possibly this plant is extinct in this locality.

Cyperus diandrus. Low cyperus.

No. 526, of the Lloyd collection, under date of October 4, 1882. It occurs quite commonly along streams and in wet soil thruout the county.

Cyperus esculentus. Yellow nut grass.

Reported in the James catalog, 1879. We have a specimen gathered in cultivated grounds. It is seldom seen.

Cyperus aristatus. Awned cyperus.

Grows along streams. Reported by Lea, 1849; Lloyd 1901.

Cyperus strigosus.

Our commonest species along streams and damp places. Our herb specimen was gathered September 9, 1887.

Cyperus speciosus.

Reported in the Lea catalog.

Kyllingia pumilla.

Often seen growing in the bed of creeks. Flowers in September.

Scirpus cyperinus.

This is Eriophorum cyperinum, reported as growing in this vicinity by Lea, 1849; Clark, 1852; and then does not seem to have been observed by collectors until sent to our herb. by Miss Lucy Braun, 1909.

Scirpus pungens. Chair-maker's rush.

Grows in swamps. James, 1879; Lloyd, August 21, 1882; Aiken, 1905.

Scirpus atrovirens.

Bristles, usually six downwardly barbed above the middle, July. Common.

Scirpus lacustris. Great Bullrush.

Reported by Lea, Clark and James. To be looked for in still, fresh water.

Scirpus lineatus.

Reported by all of our catalogs and collectors since Riddell wrote his Flora of the Western States, in 1834. This is the Eriophorum lineatum of Gray's Manual, sixth edition.

Scirpus polyphyllus.

Noted in the James catalog as belonging to our flora. We have no specimen.

Scirpus sylvaticus.

Reported by Miss Lucy Braun.

Eleocharis ovata. Ovoid spike rush.

To be found in swampy places. It is frequently reported in June. Of the genus Eleocharis Riddell's catalog mentions the species capitata and intermedia, as growing in this vicinity. Lea gives palustris, tenius and acicularis. James also gives intermedia as belonging here. We would be glad to see specimens of any of these plants.

Carex Asa-Grayii.

This species was reported by Lea, 1849. Miss Lucy Braun, 1910. Easily recognized by its large globose head.

Carex Careyana.

Gathered by C. G. Lloyd, May 12, 1890; indentified by L. H. Bailey. The species had also been reported by Lea, 1849 Does not seem to be common.

Carex cephalophora. Oval-headed sedge.

This is our most common sedge. The staminate flowers appearing at the summits of the spikes. Reported by Lea, James, Lloyd and Aiken.

Carex conjuncta. Soft Fox sedge.

C. G. Lloyd, June 10, 1890. Fide L. H. Bailey. Not reported by other collectors in Hamilton County.

Carex crinita.

This species was first reported by Dr. Frank, 1830; afterwards by Riddell, Lea and James.

Carex Davisii.

This is a rare species in Hamilton County. It was found by Lea, 1849; and Lloyd, May 27, 1890. The plant was identified by L. H. Bailey.

Carex granularis.

First reported by Dr. Frank, 1830. Also by Riddell, Lea and Lloyd. Our specimen was gathered June 1, 1888. The plant is not of frequent occurrence.

Carex hystricina.

Reported by Lea and James. We have not gathered this. The species is often confounded with Carex lurida.

Carex Jamesii.

Often met with in woods. Reported by Lea, James, Lloyd and Aiken. The Lloyd specimen bears the date of May 22, 1890.

Carex laxiflora var latifolia. White bear sedge.

This is called in Britton and Brown's Flora, Carex Albursina. It is common in woodlands. Cur widest leaf carex. The var. blanda and patulifolia are also frequently to be met with, but not as common as latifolia.

Carex lupulina. Hop sedge.

Grows in swamps and ditches. Common. Reported by all collectors since 1834.

Carex lurida.

Reported by Lea, Clark and James. We have no specimen from Hamilton County.

Carex muricata.

Found by C. G. Lloyd, June 3, 1890.

Carex oligocarpa.

Collected by Lea, James and Lloyd. The specimen of Mr. Lloyd bears the date of May 24, 1883. There is also a specimen in the Ohio State University Herb.

Carex ovularis.

Miss Lucy Braun, Madisonville.

Carex pennsylvanica.

Reported by Lea and James. Specimen in the State University Herb., from Hamilton County.

Carex pubescens.

Specimen in the Ohio State University Herb.; also in the Lloyd Herb., gathered May 24, 1884.

Carex prasina.

Collected by Lea and James. Also reported by Miss Lucy Braun, 1910.

Carex polytrichoides.

This appears in Britton and Brown, as Carex leptalia. It was reported by Lea, and not heard from again until collected in 1910, when reported by Miss Lucy Braun. It occurs in wet lands.

Carex rosea.

Grows in dry woods. Common. Reported by all collectors.

Carex scoparia.

Reported by Lea, Clark, and Miss Lucy Braun.

Carex Shortiana.

Found in the catalogs of Lea, Clark and James.

Carex sparganioides.

Collected by Lea, Clark and Lloyd. Lloyd, June 3, 1890.

Carex stenolepsis.

Known as Frankii, in the Britton Flora. Common at Cincinnati, July 26, 1890.

Carex triceps hirsuta.

Collected by Lea, James and Lloyd. Lloyd specimen collected June 10, 1890.

Carex tribuloides cristata.

Reported by Lea. There is a specimen in the Ohio State Herb., from Hamilton County.

Carex varia.

Common about Cincinnati. Our specimen gathered May 12, 1890. James and Lloyd.

Carex vulpinoides.

C. G. Lloyd, June 10, 1890. A specimen in the Ohio State Herb. Common.

ARACEAE.

Acorus calamus. Sweet flag.

Reported by Lea, Clark, James and Lloyd. Our specimen gathered May 22, 1890. To be looked for on the margins of creeks and swamps.

Symplocarpus foetidus. Skunk cabbage.

Reported by Lea, Clark, and James. It grew at Ross Lake. Habitat probably destroyed. There was also a specimen growing near the Sanitarium pond at College Hill, but the habitat has been destroyed

Arisaema dracontium. Dragon root.

This plant is only of occasional occurrence. We have gathered it at College Hill.

Arisaema triphyllum. Indian turnip.

The commonest representative of the Arum family in Hamilton County. Known to every school boy in the country thru its intensely acrid juice, May 6, 1890.

LEMNACEAE.

Spirodela polyrrhiza. Greater duckweed.

Reported by Lea, James, Lloyd, and Aiken. We would be glad to see this plant in flower or fruit.

Lemna minor.

Reported by both Lea and Clark. Has not been heard from for the past sixty years. It is probably extinct.

Lemna trisulca.

Reported by Robert Buchanan in the Clark catalog. Has not been heard from for nearly sixty years. Probably extinct.

COMMELINACEAE.

Commelina communis.

A specimen of this plant was brought to us as an escape at Newport, Ky. It was also reported as having been found in Hamilton County by Miss Lucy Braun.

Commelina nudiflora.

Found September 20, 1890, by C. G. Lloyd. Not found by other collectors.

Commelina virginica.

Reported in the James catalog.

Tradescantia flexuosa.:

Found by Lea, Clark, James, and Lloyd. The umbels of this species seem solitary and terminal. Calyx glabrous. When the flowers mature the umbels are not sessile in the bracts.
The species blossoms later than T. Virginica. Ours was gathered July 2, 1890.

Tradescantia virginica.

May 26, 1890, gathered by C. G. Lloyd. Found by all collectors.

JUNCACEAE.

Juncus acuminatus.

Reported by Lea, Clark, and Miss Lucy Braun.

Juncus effusus. Soft rush.

Not common. A swamp plant. Gathered by C. G. Lloyd, June 5, 1890.

Juncus marginatus.

Collected by Lea, Clark, and James. Not seen by recent collectors.

Juncus nodosus megocephalus.

Gathered by C. G. Lloyd July 15, 1890.

Juncus tenuis. Slender rush.

Common in beaten paths across lawns and fields. Blossoms in early summer.

Luzula campestris.

Grows usually in woods or dry fields. Gathered April 22, 1884. From this date it would appear to be one of the earliest flowering rushes.

Ferns and Flowering Plants.

LILIACEAE.

Uvularia grandiflora. Bellwort.

Common in our woods. Blooms early in May.

Oakesia sessilifolia.

This plant was found by Lucy Braun in Spring Grove, May 24, 1905. This is a new find for Hamilton County flora.

Allium canadense. Wild garlic.

Gathered by C. G. Lloyd May 28, 1880. Rare.

Allium cernuum. Wild onion.

Collected by C. G. Lloyd July 6, 1890. Rare.

Allium tricoccum. Wild leek.

Reported by Lea, Clark, and Lloyd. A rare plant.

Lilium canadense. Wild yellow lily.

Gathered by Lea and Clark, and also reported by Miss Henrietta Walter.

Lilium superbum.

Reported in the Clark catalog; also found growing wild in College Hill. The specimen in the Lloyd Herb. A rare plant in Hamilton county.

Lilium tigrinum.

This lily is to be seen growing along roadsides and escaped into fields all over the county.

Erythronium americanum. Yellow Adder's tongue.

Leaves mottled with purple. Generally blossoms the first week of April in this latitude.

Erythronium albidum. White Dog's-toothed violet.

This is the commoner variety of the two. There are large fields of it growing near Northside.

Camassia esculenta. Wild hyacinth.

Found by C. G. Lloyd April 29, 1890. A rare plant in Hamilton County. It is also recorded by Lea, Clark, and James.

Ornithogalum umbellatum. Star of Bethlehem.

Often seen as an escape from cultivation. There is considerable of it growing near the Military school. Possibly it was brought there when the college grounds were graded some years ago.

Yucca filamentosa. Adam's needle.

The only place we know of this growing wild is in the woods back of the Military school, College Hill. It was planted many years ago over the grave of President Bishop, of Farmers College, and has spread from there into the adjoining woods.

CONVALLARIACEAE.

Asparagus officinalis.

Often seen growing in waste places.

Smilacina racemosa. False spikenard.

Reported by all collectors. It usually blossoms in the latter part of May. A common plant.

Polygonatum biflorum. Smaller Solomon's seal.

Reported by James and Lloyd.

Polygonatum giganteum. Greater Solomon's seal.

Reported in the James catalog; also by C. G. Lloyd.

Trillium cernuum.

James catalog.

Trillium erectum.

Often seen about Cincinnati. The Lloyd specimen gathered April 29, 1890.

Trillium recurvatum.

James catalog, 1879.

Trillium sessile.

This is our commonest trillium. Blossoms early in April. Westwood.

SMILACEAE.

Smilax ecirrhata.

Reported by C. G. Lloyd.

Smilax glauca.

Lea, Clark, James, and Lloyd.

Smilax herbacea.

Riddell, Lea, Clark, James, and Lloyd.

Smilax hispida.

Reported by James and Lloyd.

Smilax pseudo-china.

Reported by Miss Lucy Braun. New, 1910.

Smilax rotundifolia.

Lea, Clark-Buchanan, James; also reported by Miss Henrietta Walter.

AMARYLLIDACEAE.

Hypoxis erecta.

Lea, James, and Lloyd. It is quite common.

DIOSCOREACEAE.

Dioscorea villosa.

Our specimens of Dioscorea were sent Mr. Harley Harris Bartlett, Chemical Biologist of Drug Plant Investigations, Washington, D. C. He would make two distinct varieties, naming them Dioscorea glauca and Dioscorea paniculata.

IRIDACEAE.

Iris versicolor.

Reported by Lea, Clark, and James. It has not been heard from by collectors for some years. It is possibly extinct. To be looked for in wet places.

Sisyrinchium anceps. Blue-eyed grass.

Common. Found by all collectors.

Sisyrinchium angustifolium.

Found by Miss Lucy Braun. New to Hamilton County flora.

ORCHIDACEAE.

Orchis spectabilis.

This plant has not been reported for many years. It is probably extinct in Hamilton County. It is to be found in the catalogs of Lea, Clark, and James.

Habenaria peramoena.

Lea, Clark, and James. This plant grew in Ross Lake.

Spiranthes cernua.

Reported by Lea, Clark, and James.

Spiranthes gracilis.

Reported by Riddell, Lea, and Clark. Probably extinct in Hamilton County.

Liparis liliifolia.

Reported by Lea, Clark-Buchanan, and Lloyd. Rare.

Corallorhiza odontorhiza.

Lea, Clark, James, and Aiken. Our specimen was found in the woods back of the Methodist Home, College Hill. Rare.

Corallorhiza Wisteriana.

Gathered at College Hill. A specimen sent to the State Herb. at Columbus. It is a stouter plant than C. odontorhiza, abruptly clawed, white, with crimson spots, crenulate, notched at the apex.

Aplectum hiemale. Putty root.

This is becoming a rare plant. Mr. E. W. Wilkinson brought the specimen to us in the herb., which he collected at Linwood, O.

PIPERACEAE.

Saururus cernuus. Lizard's-tail.

Reported by Lea, Clark, and James. A rare plant about Cincinnati.

JUGLANDACEAE.

Juglans cinera. Butternut.

Reported by Lea, Clark, James, and Lloyd. The tree is becoming scarce thruout the county.

Juglans nigra. Black walnut.

Common thruout the county.

Carya alba. White-heart hickory.

This is the Carya tomentosa of Nuttall. Reported by all collectors.

Carya glabra. Pig nut.

Carya porcina.

Reported by all collectors.

Carya glabra var villosa.

Miss Lucy Braun, Kilgour's woods, Oct. 14, 1905.

Carya lacinosa.

Reported by all collectors as Carya sulcata.

Carya cordiformis. Bitter nut. Swamp hickory.

This is the Carya amara of Hamilton county catalogs. Hicoria minima of Britton and Brown.

Carya ovata. Shell-bark hickory.

Carya alba. Reported by all botanists. This is the principal hickory nut of the markets.

SALICACEAE.

Populus alba. White poplar. Silver poplar.

Everywhere in the county. Spreading widely by roots.

Populus balsamifera candicans. Balm of Gilead.

This tree is often seen in cultivation. Reported in the James catalog 1879.

Populus deltoides.

This is Populus monilifera reported by all collectors. Recognized by its long catkins in early spring. Leaves broadly deltoid.

Populus grandidentata. Large-toothed aspen.

Reported in the catalogs of Lea, Clark, and James. We have no specimen from Hamilton County.

Salix alba vitellina.

Reported by Clark, Buchanan, and Lloyd.

Salix Babylonica. Weeping willow.

Quite common in cultivation thruout the county. Reported by Clark, Buchanan, and James.

Salix discolor. Glaucus willow.

Lea and Lloyd.

Salix longifolia.

James and Lloyd.

Salix nigra.

Our commonest willow. Found thruout the county.

Salix purpurea.

James and Lloyd

Salix sericea. Silky willow.

Lea, Clark-Buchanan, and Lloyd.

BETULACEAE.

Corylus americana. Hazelnut.

Lea, Clark, James, and Lloyd.

Ostrya virginiana. Ironwood.

Fairly common in the woods. Reported by all collectors. Hop-like strobile.

Carpinus caroliniana. Water beech.

Lea, Clark, James, and Lloyd.

FAGACEAE.

Fagus ferruginea. Beech.

A common woodland tree. Rapidly dying in the parks where the roots are exposed to the elements.

Castanea sativa americana. Chestnut.

There are four of those trees growing in College Hill in cultivation.

Castanea pumila.

We have seen specimens of this brought into the school room. Probably growing in cultivation. We have no specimens in the herb. from Hamilton County.

Quercus alba.

This is one of the most common oak of our hills surrounding Cincinnati.

Quercus bicolor.

Grows on the borders of streams. Lea, Clark, James, and Lloyd.

Quercus coccinea. Scarlet oak.

Common thruout the county. Reported by all collectors of plants.

Quercus imbricaria. Laurel oak.

Not so common as other species. It is easily recognized by its entire leaves, rather thick, smooth, and shining. Reported by Lea, Clark, James, and Lloyd.

Quercus Leana.

This tree is mentioned in Gray's manual, 6th edition, as a cross between Imbricaria and Coccinea. The type tree is growing in Clifton, a suburb of Cincinnati. The following is a copy of the original label on Thos. G. Lea's specimen:

Quercus Leana Nutt.

Sept. 19, 1848. A young tree on the top of the hill (Clarksons) near the side of the new road now making. I think it is on the left side going down. The inner bark is very bitter and astringent. There is no fruit on it.

Note.—We have gathered and planted the acorns from this tree within the past two or three years, but they have not germinated.

Another label of Mr. Lea reads as follows:

These specimens were gotten by J. Clark from a tree on Mrs. Cornish's farm on the west fork of Mill Creek, about twelve miles from Cincinnati. It is in the woods where there are but few oaks; a middle sized tree about the size of the one on Dr. Marshall's farm. Mr. Clark some time ago found a tree of the same species in Kentucky, about seven miles from Cincinnati, on the road from Newport to Alexandria. He brought specimens of it home and compared it with my authentic ones, and is certain of their accordance. This species will probably be found more diffused than I supposed.—Aug. 1, 1848.

Quercus macrocarpa. Burr oak.

There is a fine specimen growing near the trussel of the C. D. and T. traction, on the way down towards Spring Grove.
This tree is reported in all catalogs of our flora.

Quercus marilandica.

Reported by Miss Lucy Braun. This is new to Hamilton County flora.

Quercus Michauxii. Basket oak.

Specimens were brought into the Natural History Society which we took to be this species. Specimen also in Lloyd Herb. It has been also reported by Miss Lucy Braun.

Quercus Muhlenbergia. Chestnut oak.

Reported in the catalogs of James and Lloyd.

Quercus palustris.

Lea, Clark, and James.

Quercus rubra. Red oak.

Quite common. Lea, Clark, James, and Lloyd..

Quercus velutina. Yellow-barked oak.

This is what has been known as Q. coccinea var tinctoria. The internal bark is of an orange color. Excellent for tanning purposes. A common tree.

Quercus robur.

There is a good sized tree of this species growing on Tecoma Ave., College Hill. It was brought to this city by Mr. Warder. An English oak famed in song and story.

URTICACEAE.

Ulmus americana. White elm.

There have been some large trees about Cincinnati, but the Borer killed hundreds of them years ago. This is the species that has the fringed ciliate samara.

Ulmus fulva. Slippery elm.

The large leafed variety of Elm with the mucilaginous inner bark. Common.

Ulmus racemosa. Rock elm.

Given on the authority of Joseph F. James. We have no herb specimen from Hamilton County.

Celtis occidentalis. Hackberry.

A common tree thruout the county. The sweet berry which it bears is sometimes eaten by small boys without ill effects. The tree is very characteristic in winter, with its knotted branchlets.

Cannabis sativa. Hemp.

Quite common about the city in waste places. James and Lloyd catalogs.

Humulus Lupulus. Hop.

This plant is seen now and then about rubbish heaps. Reported by James and Lloyd.

Maclura pomifera. Osage orange.

Extensively used for hedges. Trees of a small size are now and then seen in pastures bearing the orange.

Morus rubra. Red mulberry.

A common tree of our woods. The young shoots bear a lobed leaf.

Urtica dioica. Stinging nettle.

Lea, Clark, James, and Miss Henrietta Walter.

Urtica gracilis.

Reported by James and Lloyd.

Laportea canadensis. Wood nettle.

Grows in woods. Stinging hairs. James and Lloyd.

Pilea pumila. Clear weed.

Fond of cool places. Common.

Boehmeria cylindrica. False nettle.

Fond of moist, shady places. Common.

Parietaria pennsylvanica. Pellitory.

Common along fences.

LORANTHACEAE.

Phoradendron flavescens. American mistletoe.

Growing three years ago near Mill Creek bridge at Brighton. The last time we saw it it was blackened with coal soot. The species grew at Mt. Washington, December, 1910.

ARISTOLOCHIACEAE.

Asarum canadense. Wild ginger.

Common thruout the county. According to Prof. W. A. Kellerman, specimens that we sent to him were the variation—reflexum—also acuminatum.

Aristolochia serpentaria. Birthwort.

Root gatherers have made this a scarce plant in the county. The root being of medicinal value.

POLYGONACEAE.

Rumex acetosella. Sheep sorrel.

Common on poor soil. Herbage sour. Spreads by running root stalks.

Rumex altissimus.

Reported by James 1879, and Lloyd. Mill Creek bottoms.

Rumex crispus. Curled dock.

Sometimes called the yellow dock. Leaves with strongly wavy-curled margins. Grows everywhere.

Rumex obtusifolius. Bitter dock.

Grows in fields and roadsides, lowest leaves ovate heart shaped. Common.

Polygonum arifolium. .Halberd leaved, tear thumb.

Reported in the Clark catalog; also Lea, and by Miss Lucy Braun.

Polygonum aviculare.

Common everywhere in yards. The small leaf variety.

Polygonum Convolvulus. Black bindweed.

The twining species with halberd-heart shaped leaves. Common.

Polygonum erectum.

To be found usually associated with P. aviculare. Common.

Polygonum cuspidatum.

This is a garden escape. P. Zuccarinii of Britton and Brown. Reported by Miss Lucy Braun

Polygonum hydropiper. Smartweed.

Common about drains or wet places.

Polygonum hydropiperoides.

A perennial, not acrid. Usually grows in shallow water.

Polygonum lapathifolium incarnatum.

This robust large-leafed form is a common species about Cincinnati.

Polygonum orientale. Prince's feather.

A garden escape. Came to this country from India.

Polygonum pennsylvanicum.

Reported by all collectors. The stamens and style are not conspicuously exerted in this species.

Polygonum Persicaria.

Common everywhere. Sheaths without an herbaceous border.

Polygonum sagittatum. Arrow leaved Tear-Thumb.

Reported by all collectors. Stem 4-angled. These angles, also the midrib beneath, armed with fine and sharp saw-toothed prickles.

Polygonum scandens.

This is Polygonum var scandens. It is our common species, twining high over bushes.

Polygonum virginianum.

Grows in thickets. Common. Styles deflexed in fruit, minutely hooked.

Fagopyrum esculentum. Buckwheat.

Reported in the James catalog. We have no herb. specimen from Hamilton County.

CHENOPODIACEAE.

Chenopodium album. Lamb's Quarters.

A common weed. Lea, Clark, James, Lloyd. There is also a variety of this species known as—viride—which has been brought into the herb.; it is less mealy than the alba, and with less dense inflorescence.

Chenopodium ambrosoides. Mexican tea.

Common everywhere as a weed. Lea. Clark, James, and Lloyd. There is a var. known as—anthelminticum—(Wormseed) that has been brought into the herb. on several occasions. Reported also in the Lea and Clark catalogs.

Chenopodium Boscianum.

Reported by C. G. Lloyd, 1891.

Chenopodium Botrys. Jerusalem oak.

Catalogs of Lea, Clark, and James.

Chenopodium glaucum.

First reported by Mr. C. G. Lloyd, 1891.

Chenopodium murale.

First reported by Mr. C. G. Lloyd, 1891; now quite common—1910.

Chenopodium urbicum.

Clark-Buchanan, Lloyd. Not as common as "murale". Resembles it.

Atriplex patula.

The plant growing so commonly about Cincinnati is the var. hastatum.

Salsola Kali Tragus. Russian thistle.

This is new to Hamilton County flora. Reported by Miss Lucy Braun. Specimen in the herb. This is the thistle that has proven so aggressive in the west.

AMARANTHACEAE.

Amaranthus albus. Tumble weed.

This is known as A. graecizans in recent American catalogs. The plant was first reported by Clark-Buchanan, 1852. Since that time it has spread all over the county.

Amaranthus hybridus. Pig weed.

Common in cultivated fields.

Amaranthus paniculatus. Purple amaranth.

Reported by C. G. Lloyd. Plant has come to us from the South.

Amanranthus spinosus. Thorny amaranth.

Riddell, 1834; Lea, Clark, James, and Lloyd.

Iresine celosioides.

Riddell, 1834; Lea, Clark. This is probably the eastern limit of the plant. We have no specimen from Hamilton County in the herb.

Acnida tuberculata.

Reported by C. G. Lloyd, 1891. Acnida cannabina as reported by Lea, Clark. and James was probably an error. This is a salt water plant. Our species is as named by Mr. Lloyd.

PHYTOLACCACEAE.

Phytolacca decandra. Poke weed.

Common thruout the county.

NYCTAGINACEAE.

Oxybaphus nyctagineus.

This plant was first found about Cincinnati by Mr T. W. Spurlock; it was reported in the James catalog, 1879. Mr. Lloyd says it was a rare plant in 1891. It is now common thruout the county—1910.

ILLECEBRACEAE.

Anychia capillacea. Slender forked chickweed.

Clark, 1852. Lloyd, 1901. Common. This is A. polygonoides of Gray, 7th edition.

Anychia dichotoma. Forked chickweed.

Lea, James, and Lloyd. Common.

AIZOACEAE.

Mollugo verticillata. Indian chickweed.

Common. Often seen spreading itself in the crevices of brick pavements or in sandy places.

CAROPHYLLACEAE.

Arenaria serpyllifolia. Thyme-leaf sandwort.

A specimen from Hamilton County at Ohio State University. James catalog; also T. L. A. Greve.

Stellaria longifolia. Long-leaf stichwort.

Lea, Clark; also reported by Miss Lucy Braun.

Stellaria media. Chickweed.

Common everywhere. Can be seen in bloom nearly every month of the year.

Stellaria pubera.

Common in shaded places.

Cerastium arvense.

Clark and James catalog.

Cerastium nutans.

Lea, James, and Lloyd. This is the one with the long penduncles.

Cerastium viscosum.

Lea, Lloyd. This is an annual plant. Common.

Cerastium vulgatum.

Clark, James, and Lloyd. A perennial plant. Common.

Holosteum umbellatum. Jagged chickweed.

Grows in considerable abundance on the south side of Presbyterian Church, College Hill. Reported in 1898 as new to Ohio flora by W. H. Aiken.

Agrostemma githago. Corn cockle.

Clark, James, and Aiken. Usually found growing in grain fields.

Silene antirrhina. Sleepy catchfly.

Reported by Lea, Clark, James, and Lloyd.

Silene nivea.

Riddell, Lea, Clark, and James. A single plant was found by Lea.

Silene noctiflora. Night flowering catchfly.

Reported by Miss Lucy Braun. No specimen in herb. from Hamilton County.

Silene virginica.

Lea, Clark, and Lloyd.

Silene stellata.

This is our common species.

Saponaria vulgaris. Bouncing Bet.

Common all over the county along the road sides.

Diandrus armeria. Deptford pink.

Reported by Miss Lucy Braun. An escape probably.

PORTULACACEAE.

Claytonia Virginica. Spring beauty.

Common thruout the county. The leaves of this plant vary considerably in width, so much that this species has been reported as Caroliniana. We have no specimen of Claytonia Caroliniana in the herb. from Hamilton County.

Portulaca oleracea. Purslane.

Reported by Clark, 1852; James and Lloyd. Common in vegetable gardens.

Ferns and Flowering Plants.

CERATOPHYLLACEAE.

Ceratophyllum demersum. Hornwort.

There is a specimen of this plant in the Ohio State University from Hamilton County. It is given in the Lea catalog and the James as belonging to our flora. Rare. We have no specimen from Hamilton County in the herbarium.

NYMPHAEACEAE.

Nymphaea advena. Cow lily. Yellow pond lily.

Lea, Clark and James catalog. Probably no longer occurs in Hamilton County.

Nelumbo lutea.

This plant was given in the Lea catalog, but in 1852 it was supposed to be extinct. The progress of civilization has driven it away.

RANUNCULACEAE.

Ranunculus abortivus. Small flowered crow-foot.

This biennial is a common plant about Cincinnati. Reported by all collectors.

Ranunculus acris. Buttercups.

Clark-Buchanan, James, Miss Lucy Braun. Rare.

Ranunculus aquatilis capillaceus.

Grew in great abundance in a swamp in 1882, near Glendale.

Ranunculus fascicularis.

Plants so named in the schools we think should be referred to—septentrionalis. Fascicularis has its carpels scarcely margined.

Ranunculus micranthus.

In the sixth edition of Gray this appears as a var. of abortivus. Common.

Ranunculus multifidus.

Reported in the James catalog; was found in a swamp near Glendale. It is probably now extinct.

Ranunculus recurvatus. Hooked crow-foot.

Common. The achenes has a long, recurved beak.

Ranunculus sceleratus. Ditch crow-foot.

James, 1879; Lloyd.

Ranunculus septentrionalis.

Reported by C. G. Lloyd 1890. This plant varies in the neighborhood of Cincinnati as to its size and foliage. The carpels are strongly margined.

Thalictrum dioicum. Early meadow-rue.

Reported by all collectors. Blossoms about the 15th of April.

Thalictrum polyganum. Tall meadow-rue.

Lea, Clark and James, and Aiken. May 20.

Thalictrum purpurascens. Purplish meadow-rue.

James and Aiken.

Anemonella thalictroides. Rue-Anemone.

Common in woodlands. Sometimes the flowers appear double. April 7.

Hepatica acutiloba. Liver-leaf.

Clark, James, and Lloyd. There is a locality near Linwood known to E. W. Wilkinson, also one near College Hill known to Dr. Eugene Swope.

Anemone canadensis.

This appears in the James catalog under the name of A. dichotoma. This latter species is a Siberian species, with glabrous ovate achenes. The achenes of Anemone Canadensis is nearly orbicular. It is possible that plants referred to this species should be named Anemone Virginiana.

Anemone virginiana.

The head of the fruit oval or oblong. Common about Cincinnati.

Isopyrum biternatum.

This plant resembles Anemonella thalictroides in its general appearance. We have gathered it April 11. Common.

Caltha palustris. Marsh marigold.

This plant is fast disappearing from our flora, owing to the drainage of all damp places. Reported by T. W. Spurlock, 1879, from Ross Lake. There is a specimen in the Ohio State University from Hamilton County.

Aquilegia canadensis. Columbine.

Reported by Lea, Clark, James, and Aiken. This is a rare plant in this part of the state. It has been destroyed root and branch because of the beauty of its flower A. coccinea which has appeared from the south. The latter species has been reported by Miss Lucy Braun.

Delphinium consolida.

This plant is reported in the Clark and James catalog. We have not seen it. It resembles Delphinium ajacis very closely in its appearance, which is occasionally seen as a garden escape.

Delphinium tricorne.

Our common species reported by all collectors. Sometimes an albino form is found. The white species is not common.

Cimicifuga racemosa. Black snake root.

Lea, James, and Lloyd. To be found in Northern Ohio in greater abundance than near Cincinnati. Grows in rich, open woods.

Actaea alba. White baneberry

Root gatherers have cleared the woods of this species. It is only occasionally that a specimen comes into the herbarium. Lea, Clark, James, and Lloyd.

Hydrastis canadensis. Orange root. Yellow Puccoon.

Appears occasionally in rich woods. Destroyed by root gatherers on account of its medicinal qualities.

MAGNOLIACEAE.

Magnolia acuminata. Cucumber tree.

Fruit resembles a small cucumber. There is a large tree growing on the grounds of Mr. John Sheets, of College Hill.

Liriodendron tulipifera. Tulip tree.

Common. Reported by Lea, Clark, James, and Lloyd. Leaves appear as if cut.

ANONACEAE.

Asimina triloba. Papaw.

Usually blossoms towards the end of April. A common tree. Pulp sweet.

MENISPERMACEAE.

Menispermum canadense.

Common. Reported by all collectors. It bears a berry in the fall and winter which look like frost grapes.

BERBERIDACEAE.

Podophyllum peltatum. May apple.

Common everywhere thruout the county. The leaves and root are drastic.

Jeffersonia diphylla. Twin leaf. Rheumatism-root.

Reported by all collectors. April 11.

Caulophyllum thalictroides. Blue Cohosh.

Lea, Clark, James, and Lloyd. Rare.

LAURACEAE.

Sassafras officinale.

This is Sassafras varifolium of Gray, 7th edition. Common.

Lindera Benzoin.

This is Benzoin aestivale of Gray, 7th edition. Grows along streams in woods.

PAPAVERACEAE.

Sanguinaria canadensis. Bloodroot.

Common. Grows in rich, open woods. Flowers early in April.

Stylophorum diphyllum. Celandine poppy.

Reported by all collectors.

Chelidonium majus. Celandine.

Reported in the James catalog. A specimen from Hamilton County in Ohio State University Herb.

Argemone mexicana. Mexican poppy.

Reported by James and Lloyd. Possibly a garden escape.

FUMARIACEAE.

Dicentra cucullaria. Dutchman's Breeches.

Common in certain localities. It grows from small tubers. Flowers in April.

Dicentra canadensis. Squirrel Corn.

Reported by all collectors. Fowers are fragrant.

Corydalis flavula.

James and Lloyd. This plant was called Corydalis aurea by the earlier botanists, but the outer petals of aurea are not crested, while those of flavula are wing-crested on the back.

CRUCIFERAE.

Draba verna. Willow grass.

This is not common. Reported by Lea, Clark and Lloyd.

Lepidium campestre.

Clark, James, and Aiken. Growing in waste places.

Lepidium virginicum. Pepper grass.

Common. Growing everywhere in the county.

Capsella Bursa-Pastoris. Shepherd's Purse.

One of the commonest of weeds. Grows everywhere.

Brassica nigra. Black mustard.

The waste places about Cincinnati are covered with this plant.

Sisymbrium canescens. Tansy mustard.

This is Sophia pinnata of Britton and Brown. Reported from Anderson's Ferry. Specimen at Ohio State University from Hamilton County.

Sisymbrium officinale. Hedge mustard.

Reported by James, 1879. Lloyd, 1890. Now common everywhere.

Sisymbrium Thalianum.

Known as Stenophragma Thaliana in Britton and Brown. A single waif in the collection of W. H. Aiken, Lloyd Herb; also reported by Lucy Braun.

Erysimum cherianthoides. Worm seed mustard.

Reported in the James catalog. Specimen in Herb. of Ohio State University.

Nasturtium armoracia. Horseradish.

James catalog. Escaped from cultivation.

Nasturtium officinale. Water cress.

James and Lloyd. Grows in brooks and ditches.

Nasturtium palustre. Marsh cress.

Reported by all collectors. Common in brooks.

Nasturtium sessiliflorum.

Reported in the James catalog; also by Miss Lucy Braun.

Nasturtium sinuata.

Reported by Miss Lucy Braun.

Barbarea vulgaris. Winter Cress.

Lea, Clark, and Lloyd. The specimen in the herb. was gathered at Mt. Lookout.

Iodanthus pinnatifidus.

This is Thelypodium pinnatifidum of sixth edition Gray. It is a common plant in damp woodlands. Reported by all collectors.

Dentaria diphylla.

Not common. A specimen in herb. from Anderson's Ferry from Miss Lucy Braun. Reported by all collectors since Riddell.

Dentaria laciniata. Toothwort.

Common everywhere thruout the county.

Dentaria heterophylla.

Reported in the James catalog; also by Miss Lucy Braun.

Cardamine Douglassii.

This is Cardamine rhomboidea var purpurea of Gray, 6th edition. It blossoms early in April in the vicinity of Cincinnati.

Cardimine hirsuta. Hairy bitter cress.

Lea, Clark, and Lloyd. Quite common.

Cardamine parviflora.

This is Cardamine hirsuta var sylvatica of Gray's sixth edition. It was reported in the James catalog, 1879. We have a specimen in the herb. from Miss Lucy Braun, gathered in Ferris woods.

Cardamine pennsylvanica.

Reported by Miss Lucy Braun. We have no specimen in the herb. from Hamilton County.

Arabis dentata.

Lea, James, and Lloyd. Common.

Arabis canadensis. Sickle pod.

Lea, Clark, James, and Aiken, 1905. College woods.

Arabis glabra. Tower mustard.

This is Arabis perfoliata of Gray, 6th edition. Common. James catalog.

Arabis hirsuta.

Clark and James catalog.

Cardamine virginica.

This is Cardamine ludoviciana reported by Lea, Clark, and James.

Hesperis matronalis.

A specimen found by T. W. Spurlock in Storrs township, 1884. There is a specimen from Hamilton County in the Ohio State Herb.

CAPPARIDACEAE.

Polanisia graveolens.

Reported by all collectors. Not common.

CRASSULACEAE.

Sedum ternatum.

Common in woods. Blooms the latter part of May.

Penthorum sedoides. Ditch stone crop.

Common in creeks all over the county.

SAXIFRAGACEAE.

Saxifraga virginiensis.

Lea, Clark, James, and Aiken. Not common. Open woodlands.

Heuchera americana. Alum root.

All collectors. Common in woodlands.

Mitella diphylla.

Reported in the Lea and Clark catalog. The plant is probably extinct about Cincinnati. It has been sent to the herb. within the past two years from an adjoining county.

Hydrangea arborescens.

Reported by all collectors. Its favorite habitat is the banks of creeks in woods.

Ribes Cynosbati. Prickly gooseberry.

Reported by all collectors. Common. Grows in shaded places.

Ribes floridum. Wild black currant.

Reported by Miss Lucy Braun. We do not have this in the herb. from Hamilton County.

Ribes gracile.

C. G. Lloyd, 1891. Miss Lucy Braun. 1910.

HAMAMELIDACEAE.

Hamamelis virginiana. Witch-Hazel.

Lea, Clark-Buchanan, James. We have no specimen in the herb. gathered of late years.

Liquidambar Styraciflua. Sweet Gum.

Reported in the James catalog. Also by W. H. Aiken. Botanists have written to the herbarium asking whether this tree has ever been seen growing wild north of the Ohio River. Prof. W. H. Pabodie, of Woodward High School, says, "This tree without question is one of our native forest trees," there is a large tree growing on the right hand side of the road leading from Wyoming to the Country Club. A specimen was also reported as growing in the woods of Mt. Healthy by Prof. A. P. Morgan. This was as far as is known the northern limit of the tree in Ohio.

PLATANACEAE.

Platanus occidentalis. Sycamore. Button wood.

One of our largest native trees. Reported by all collectors. Seen for miles from our hilltops, following the course of the creeks. The Tyler-Davidson fountain is surrounded by these trees. They were ordered to be planted there during a sojourn of Mr. Probasco in Europe. It was the wish of Mr. Probasco that upon his return to Cincinnati that he would see the beautiful European sycamore—Acer Pseudo-Platanus, a species of maple—surrounding Fountain Square, but was disappointed to find instead thereof the sycamore of America—Platanus occidentalis. This tree is considered as one of the handsomest trees that grows by European lovers of trees.

ROSACEAE.

Physocarpus opulifolius. Nine-bark.

Reported by Lea, Clark, and James. We have only seen this plant in cultivation.

Spirea (species).

Cultivated species are common. In the Clark catalog S. Lobata is given as occurring here; also S. Aruncus in both Lea and Clark.

Gillenia stipulacea. American Ipecac.

Lea, Clark, and James.

Pyrus coronaria. Crab apple.

Lea, Clark, and James.

Amelanchier canadensis. Shad Bush. Service Berry.

Lea and James.

Crataegus coccinea.

Lea, James, and Lloyd.

Crataegus Crus-galli. Cockspur Thorn.

Reported by all collectors

Crataegus mollis.

This is Crataegus coccinea, var mollis of Gray, 6th edition. Lea and Lloyd.

Crataegus oxyacantha. English Hawthorn.

Reported in the Lloyd catalog.

Crataegus punctata.

Lea, Clark, and Lloyd.

Crataegus tomentosa. Pear Haw.

Lea, Clark, and James. We have no specimen of this from Hamilton County.

Fragaria vesca var americana. American Wood strawberry.

Reported by Miss Lucy Braun. Not in the herb.

Fragaria virginiana var illinoensis.

Lloyd and Aiken. Growing in the woods back of Military school.

Potentilla arguta. Glandular Cinquefoil.

Potentilla canadensis. Five finger.

Common thruout the county.

Potentilla monspeliensis var norvegica. Bushy Cinquefoil.

Grows in open fields. Found by all collectors.

Potentilla recta.

This plant was first found growing in Eden Park 1884 by Miss Sarah C. Stubbs. It is a strong growing species. It is now quite common about the city. James and Aiken

Geum canadense. Avens.

Clark, James. and Lloyd catalog. This is the Geum album of 6th edition Gray.

Geum vernum.

Lea, Clark, James, and Lloyd. Common. Flowers in May.

Geum virginianum.

Lea, Clark, and James catalog.

Rubus canadensis. Dewberry.

Quite common in dry fields.

Rubus occidentalis. Black raspberry.

Reported by all collectors. Leaves are whitened underneath.

Rubus villosus. Common blackberry.

Everywhere in the county.

Rubus villosus var humifusus.

Given in Britton and Brown as Rubus Baileyanus. This has come into the herbarium several times within the past two years, 1908-1910, and said to be intermediate in habit between villosus and canadensis. We can not see that it is a clearly distinct variation in this locality.

Agrimonia mollis.

This is Agrimonia Eupatoria of the 6th edition of Gray's manual, but according to American botanists A. eupatoria is a European plant, and does not occur in this country. A. mollis is reported by all collectors. Common.

Agrimonia parviflora.

Reported by Lea, 1849, and Miss Lucy Braun, 1905. Rare.

Agrimonia striata.

Reported by Miss Lucy Braun. We have no specimen in the herb. from Hamilton County.

Rosa carolina.

Lea, Clark, and Miss Lucy Braun.

Rosa humilis. Pasture rose.

Collected by C. G. Lloyd.

Rosa rubiginosa. Sweet brier.

Lea, Clark, James, and Aiken. Growing in woods at College Hill.

Rosa setigera.

Lea, Clark, James, and Lloyd.

Prunus americana.

Lea, Clark, James, and Lloyd.

Prunus pennsylvanica.

The occurrence of this species is marked in the Lloyd catalog as being very doubtful.

Prunus serotina. Wild black cherry.

Common thruout the county.

Prunus mahaleb.

This has been introduced into our parks, and is the species most commonly seen by Cincinnatians. In the East it spreads from cultivation.

LEGUMINOSAE.

Desmanthus illinoensis.

Specimen in the herb. from Miss Lucy Braun. Collected in Section Woods, Indian Hill, July 25, 1905.

Gymnocladus dioica. Kentucky coffee-nut tree.

Common at College Hill. Lea, Clark, James, and Lloyd.

Gleditsia triacanthos. Honey locust.

Common. The long pod is filled with a sweet pulp between the seeds.

Cassia marilandica. Senna.

Lea, Clark, James, and Lloyd; also Miss Lucy Braun, Aug. 18, 1905.

Cassia chamaecrista. Partridge Pea.

James and Lloyd. Specimen in Ohio State University from Hamilton County.

Cercis canadensis. Red bud.

A common tree lending a brilliant color to the spring foliage while in bloom.

Baptisia australis. Blue false indigo.

Reported by Riddell, Lea, Clark, James, and Miss Henrietta Walter.

Cladrastis lutea. Yellow wood.

This is Cladrastis tinctoria of Gray's 6th edition. A large tree grows in front of the residence of Mr. Bahmann, College Hill, O. Rare.

Trifolium agrarium.

Reported by James and also by Miss Lucy Braun.

Trifolium hybridus. Alsike clover.

This species resembles T. repens in its habits of growth. Seen occasionally.

Trifolium incarnatum. Crimson clover.

Reported by W. H. Aiken to Ohio Academy of Science. Specimen in herb.

Trifolium pratense. Red clover.

Common everywhere.

Trifolium repens. Common white clover.

Clark, James, and Lloyd.

Trifolium stoloniferum. Buffalo clover.

Growing quite abundantly in 1908 in a field near the Methodist Home, College Hill.

Melilotus officinalis.

James and Lloyd. Corolla yellow.

Melilotus alba.

Very common along roadsides and in waste places about Cincinnati. The seed of this plant was sown some twenty years ago by Mr. Muth, who was interested in bees, but the plant has ruined the honey of many hives, making it black and thin. The plant was first reported as growing here by James, 1879.

Medicago sativa. Lucerne, Alfalfa.

Becoming quite common as an escape. Reported in Society of Natural History catalog by W. H. Aiken, 1904.

Medicago lupulina.

James and Lloyd. Common in waste places.

Psoralea Onobrychis.

Reported by Lea, Clark, and James. Specimen in herb. of Ohio State University.

Amorpha fruticosa.

A plant was found growing at Riverside. Fide W. H. Aiken. Rare.

Tephrosia virginiana.

A specimen from Hamilton County in the herb. of the State University. Rare.

Robinia hispida.

This species of locust comes from the South; it is seen only in cultivation. It is quite common about Cincinnati

Robinia Pseudo-Acacia. Common locust.

Grows everywhere in the county. Clark, James, and Lloyd.

Astragalus canadensis.

Lea, Clark, and James. Rare.

Astragalus neglectus.

This is Phaca neglecta of Britton and Brown. Lea, Clark, and James. Rare. A specimen is in the herb. of the State University at Columbus.

Coronilla varia.

We have a specimen of this gathered by Miss Lucy Braun.

Desmodium acuminatum.

Lea, Clark, James, and Lloyd. This is D. grandiflorum of the 7th edition of Gray's manual.

Desmodium canescens.

Common. Lea, Clark, James, and Lloyd.

Desmodium Dillenii.

Collected by Lea and Lloyd.

Desmodium nudiflorum.

Dry woods. Lea, Clark, James, and Lloyd.

Desmodium paniculatum.

Lea, Clark, James, and Lloyd.

Desmodium pauciflorum.

Lea, Clark, and Lloyd.

Desmodium rotundifolium.

Lea, Clark, and Aiken. This seems to be a rare plant except on a hillside back of the Ohio Military school. Specimen in herb.

Lespedeza procumbens.

Riddell, Lea, Clark, James, and Lloyd. Woodlands.

Lespedeza repens.

Lea, Clark, James, and Miss Braun.

Lespedeza violaceae.

Lea, Clark, James, and Miss Braun.

Vicia sativa.

A patch of this growing at College Hill, back of Belmont flats. Specimen in the State University.

Vicia cracca.

Reported by Miss Lucy Braun. We have no specimen of this in our herb. from Hamilton County.

Vicia angustifolia.

Reported by Miss Lucy Braun. This is close to V. sativa.

Lathyrus venosus.

Reported by Lea and Clark. Has not been heard from for many years. Is probably extinct.

Apios tuberosa.

Lea, Clark, and James. Grew at Ross Lake. The growth of the city may have destroyed this locality. Reported also by Miss Lucy Braun, 1908.

Strophostyles helvola.

This is S. angulosa, of Gray's sixth edition. Specimen at Ohio State University from Hamilton County. Reported by all collectors.

Amphicarpaea monoica.

Lea, Clark, James and Lloyd.

LINACEAE.

Linum medium.

A specimen was sent to the herb. by Miss Lucy Braun. The plant is close to L. Virginianum, reported in the Clark catalog.

Linum usitatissimum. Flax.

James and Aiken. Specimen in Ohio State University from Hamilton County.

OXALIDACEAE.

Oxalis grandis.

This is Oxalis recurva of the sixth edition of Gray. Lloyd and Aiken. Common in the woods of College Hill.

Oxalis stricta.

This is Oxalis corniculata var stricta of Gray's sixth edition. Common.

Oxalis violacea.

Blossoms towards the end of April. Bulbous. Common in open woods.

GERANIACEAE.

Geranium carolinanum. Cranesbill.

James, Lloyd, and Aiken. Not as common as G. maculatum.

Geranium maculatum.

Common in woods Lea, Clark, James, and Lloyd.

RUTACEAE.

Zanthoxylum americanum. Prickly ash.

Shrub aromatic. James, Lloyd, and Aiken. College Hill woods.

Ptelea trifoliata. Hop tree.

Lea, Clark, James, and Aiken. Growing near Methodist Home, College Hill.

SIMARUBACEAE.

Ailanthus glandulosa.

Staminate flowers of unpleasant odor. Some years ago this tree was extensively cultivated as a shade tree about Cincinnati, being a tree of rapid growth. It does not mind coal soot.

POLYGALACEAE.

Polygala sanguinea.

Common in College Hill, back of the Whitfield property. Lloyd and Aiken.

Polygala senega.

Reported by Clark, James, and Aiken. Rare.

EUPHORBIACEAE.

Croton capitatus.

James and Lloyd. Rare.

Acalypha virginica.

Lea, Clark, James, and Lloyd. Common.

Acalypha gracilens.

Miss Lucy Braun, W. H. Aiken. Specimen in herb.

Ricinus communis. Castor Oil plant.

This grows commonly about Cincinnati in cultivation.

Phyllanthus carolinensis.

Riddell, James, and Lloyd. Rare. Specimen also in Ohio State University.

Euphorbia commutata.

Reported in the James catalog. Specimen in the Ohio State University from Hamilton County.

Euphorbia corollata.

Lea, Clark. James and Lloyd. This is not common.

Euphorbia cyparissias.

Loveland, Ohio—James; also on Highland Avenue, College Hill. It is probable that this locality has been a dump from some garden.

Euphorbia dentata.

Lloyd and Aiken. Specimen in herb.; also at Columbus. Not common.

Euphorbia maculata.

Common everywhere. This is the species that lies prostrate on the ground.

Euphorbia marginata. Snow on the mountain.

Escaped from cultivation. James and Lloyd.

Euphorbia obtusata.

Clark and Lloyd.

Euphorbia Preslii.

Reported by all collectors. Common.

CALLITRICHACEAE.

Callitriche deflexa. var Austini.

This is a very rare plant. It was brought into the Second Intermediate school by Miss Louise V. Stewart, some years ago, growing on the damp ground of an old orchard. It is a small plant and may be easily overlooked.

LIMNANTHACEAE.

Floerkea proserpinacoides.

Reported by Mr. T. W. Spurlock. Specimen in the Ohio State University. It had also been reported by Riddell and Clark. It is a small plant probably overlooked. Grows in marshes and on river banks.

ANACARDIACEAE.

Rhus copallina. Dwarf sumach.

Lea, Clark, and James. Petioles wing-margined.

Rhus glabra. Smooth sumach.

Lea, Clark, James, and Lloyd. Leaves whitened beneath.

Rhus toxicodendron. Poison Ivy.

Lea, Clark, James, and Lloyd. Climbs over fences. We think that our species is the var. radicans, having more entire leaves.

Rhus typhina. Staghorn sumach.

Shrub bearing a terminal panicle of flowers. Common. Red in the winter.

AQUIFOLIACEAE.

Ilex verticillata. Black alder.

Lea, Clark, and James. Fine specimens were growing near the pond of the Pierson property, in College Hill.

CELASTRACEAE.

Euonymus atropurpureus. Waahoo.

Lea, Clark, James, and Lloyd. Fruit crimson, drooping on long peduncles.

Euonymus obovatus.

This is the species that trails on the ground. James and Aiken. Same as E. americanus var obovatus of the sixth edition, Gray's Manual.

Celastrus scandens. Climbing bitter-sweet.

Gathered by all collectors. The opening, orange colored pods are very ornamental in the fall of the year.

STAPHYLEACEAE.

Staphylea trifolia.

Lea, Clark, James, and Lloyd. Shrub with greenish striped branches.

ACERACEAE.

Acer negundo. Box Elder.

Lea, Clark, James, and Lloyd. Seen in cultivation as well as wild.

Acer rubrum. Red Maple or Swamp Maple.

Lea, Clark, James, and Lloyd. A small tree with redish twigs.

Acer saccharinum. White or Silver maple.

This is Acer dasycarpum of Gray's sixth edition. Lea, Clark, James, and Lloyd.

Acer saccliarum. Sugar or Rock maple.

Flowers appear with the leaves. Reported by Lea, Clark, James, and Lloyd. There is also a var. nigrum, that is quite commonly seen about Cincinnati, known as the black sugar maple. Reported by Clark, James, and Lloyd.

SAPINDACEAE.

Aesculus glabra. Fetid Ohio buckeye.

Lea, Clark, James, and Lloyd. Flowers small, not showy.

Aesculus hippocastanum. Common Horse-chestnut.

Growing in cultivation and self sown. Common about the suburbs of the city.

Aesculus octandra. Sweet buckeye.

This is the tree bearing the smooth fruit. Aesculus flava of sixth edition of Gray's manual. Lea, Clark, James, and Lloyd.

BALSAMINACEAE.

Impatiens pallida. Pale yellow touch-me-not.

This is Impatiens aurea of sixth edition, Gray's manual. Common.

Impatiens biflora. Orange colored spotted touch-me-not.

This is I. fulva of former editions. Common.

RHAMNACEAE.

Rhamnus catharticus.

Reported by Miss Lucy Braun. We have no specimen from Hamilton County.

Rhamnus lanceolata.

Lea, Clark, and James.

Ceanothus americanus. New Jersey Tea.

Lea, Clark, and James. Also found growing near Ridgelawn Ave., College Hill.

VITACEAE.

Ampelopsis quinquefolia. Virginia Creeper.

Reported by all collectors. Common.

Vitis aestivalis. Summer grape.

Lea, Clark, and Aiken.

Vitis cordifolia. Winter or frost grape.

Lea, Clark, James and Lloyd.

TILIACEAE.

Tilia americana. Linden. Basswood.

Lea, Clark, James, and Lloyd. Common.

Tilia heterophylla. White basswood.

Reported by C. G. Lloyd. Grew on hillside back of the Observatory.

MALVACEAE.

Abutilon avicennae. Velvet leaf.

This appears in the 7th edition of Gray's manual as A. Theophrasti. Lea, Clark, James, and Lloyd. A common weed about Cincinnati.

Sida spinosa.

Lea, Clark, James, and Lloyd. A common garden weed.

Althaea rosea. Hollyhock.

The hollyhock persists after cultivation, and is often seen growing in vacant lots and waste places.

Malva rotundifolia. Cheeses.

Lea, Clark, James and Lloyd. Waysides and cultivated ground.

Malva crispa. Curled Mallow.

This plant has been sent to us several times. It is a garden escape growing spontaneously.

Napaea dioica.

Reported by Lea, Clark, and James. The plant was inserted in the latter catalog on the authority of Mr. Spurlock, who found it growing here. The plant has not been found since 1882, and is probably extinct.

Hibiscus militaris.

Found growing wild in 1883, by Mr. Geo. B. Twitchell, near Delhi. Rare. Reported in the Lea, Clark, and James catalog.

Hibiscus trionum. Flower of an hour.

James catalog. Growing wild at College Hill, back of Glenwood flats.

HYPERICACEAE.

Ascyrum hypericoides.

Ascyrum crux-andrae of 6th edition. This plant is reported in the Ohio State University catalog as having been sent to them from Hamilton County. We have never seen the plant growing here, nor has it been sent to us. Rare.

Hypericum canadense.

This plant was reported in the Clark catalog—Buchanan addenda—as having been found near Carthage. We have no specimen from Hamilton County. Rare.

Hypericum Drummondii.

Found by C. G. Lloyd, August 1, 1886. Rare in Hamilton County.

Hypericum maculatum.

Lea, Clark, James, and Lloyd. Blossoms early in July.

Hypericum gentianoides. Orange grass. Pinweed.

Hypericum nudicaule.

Of the 6th edition. Reported by C. G. Lloyd. Specimen in herbarium. Grows along roadside, going up the river.

Hypericum mutilum.

Lea, Clark-Buchanan, James, and Lloyd.

Hypericum perforatum. Common St. John's wort.

Lea, Clark, James, and Lloyd. The specimen in herb. found near the Zoo.

Hypericum prolificum.

Lea, Clark, and James. A specimen was found July 30, 1897, by F. F. Ferris, at Westwood; identified by Mr. Lloyd. Not often seen.

VIOLACEAE.

Solea concolor. Green Violet.

Lea, Clark-Buchanan, James, and Lloyd. Botanists are fond of changing the name of this plant. In Britton and Brown it is known as Cubelium, and in the 7th edition of Gray, as Hybanthus. Rich, moist woods.

Viola canadensis.

Lea, Clark, James, and Lloyd. Common. Petals white inside, outside tinged with violet.

Viola cucullata. Meadow violet.

This appears in the 6th edition as Viola palmata var cucullata. Reported by Riddell, Lea, Clark, James, and Lloyd.

Viola palmata.

This is a rare plant in this vicinity. We have never seen it growing but upon one occasion.

Viola pubescens. Downy yellow violet.

Lea, Clark, and Lloyd. This is our common, yellow species.

Viola Rafinesquii. Wild pansy.

This is V. tricolor var arvensis, reported by Clark, James, and Lloyd.

Viola scabriuscula. Smooth yellow violet.

Specimen in herb. from Miss Lucy Braun. This is very similar to V. pubescens.

Viola striata. White violet or Cream color.

Lea, Clark, James, and Lloyd. Our common, white species.

PASSIFLORACEAE.

Passiflora lutea. Passion flower.

Lea, Clark, James, and Lloyd. Not often found. Belongs further South.

CACTACEAE.

Opuntia vulgaris.

Found by Dr. J. H. Hunt, at Valley Junction, Ohio, where it had apparently become naturalized; also reported by Miss Lucy Braun.

THYMELACEAE.

Dirca palustris. Moosewood.

Reported by Clark-Buchanan and James. This plant is of very doubtful occurrence. We have no specimen in the herb. from Hamilton County, nor know of any locality where it is growing at present.

LYTHRACEAE.

Rotala ramosior.

This is Ammania humilis of the 6th edition of Gray. Gathered by Riddell, Lea, Clark-Buchanan, James, and Lloyd.

Lythrum alatum.

Lea, Clark, and James.

Cuphea petiolata.

James and Aiken. Not common. We gathered it at College Hill, on the Bakewell property.

ONAGRACEAE.

Ludwigia alternifolia.

Lea, Clark, James and Lloyd.

Ludwigia palustris.

Lea, Clark, James and Lloyd.

Epilobrium coloratum.

Lea, Clark, James, and Lloyd. Found growing near Emerson's pond, by Mr. Max Braam, September, 1910.

Oenothera biennis. Evening primrose.

Lea, Clark, James, and Lloyd. Common.

Oenothera fruticosa.

Reported by Miss Lucy Braun. We have no specimen of this in herb. from Hamilton County.

Gaura biennis.

Lea, Clark, James and Lloyd.

Circaea lutetiana.

Lea, Clark, James, and Lloyd. Common in woods.

HALORAGIDACEAE.

Myriophyllum ambiguum.

Clark-Buchanan. Not heard from since 1852.

Myriophyllum scabratum.

Clark-Buchanan. Probably extinct.

Myriophyllum spicatum.

This plant was growing at Mill-creek bridge 75 years ago, 1835. At that time Mill creek was not a great open sewer.

ARALIACEAE.

Aralia racemosa. Spikenard.

Lea, Clark, James, and Lloyd. A specimen was brought into the herb. by Mr. A. M. Crane, of Walnut Hills High School, October, 1910.

Aralia spinosa. Angelica tree. Hercules club.

Clark and James. Specimen in the herb. gathered, 1875, by Dr. T. L. A. Greve.

Panax quinquefolium. Ginseng.

Lea, Clark, James and Lloyd. Scarce. Destroyed by root diggers.

UMBELLIFERAE.

Sanicula marilandica.

Lea, Clark, James, and Lloyd. Styles exceeding the bristles of the fruit.

Sanicula canadensis.

Lea, Clark, and Aiken, June 5, 1896. Styles shorter than the bristles.

Sanicula trifoliata.

Reported by Miss Lucy Braun. No specimen in herb. from Hamilton County.

Erigenia bulbosa.

Lea, Clark, James, Lloyd. One of our earliest spring flowers.

Chaerophyllum procumbens.

Lea, James, and Lloyd.

Osmorhiza brevistylis. Sweet Cicely.

Lea, Clark-Buchanan, James, Lloyd.

Osmorhiza longistylis.

Lloyd, Aiken.

Conium maculatum. Poison Hemlock.

Clark-Buchanan and Miss Lucy Braun.

Cicuta bulbifera.

Lea, Clark, and James. Grew in canal near Ross Lake, 1888. Found by Mr. Spurlock.

Cicuta maculata.

Lea, Clark, James and Lloyd.

Cryptotaenia canadensis.

Common everywhere.

Taenidia integerrima.

This is Pimpinella integerrima of Gray's 6th edition. Common.

Bupleurum rotundifolium.

This was brought into the herb. by a root gatherer. Reported by C. G. Lloyd.

Thaspium barbinode.

Riddell, Lea, Clark, James, and Lloyd. Common.

Thaspium aureum.

Lea, Clark, and James

Thaspium pinnatifidum.

Reported by Miss Lucy Braun. Not in herb. from Hamilton County.

Pastinaca sativa.

Lloyd, 1891. Now one of our commonest weeds.

Heracleum lanatum.

Lea catalog. Found, 1884, in Cumminsville, by Mr. Going.

Caucalis anthriscus.

First found by C. G. Lloyd, at Mt. Lookout. It was supposed to have been introduced in 1884, with some imported cattle of Mr. Kilgour's.

Daucus carota. Wild carrot.

C. G. Lloyd, 1891. Growing all over the county, 1910.

CORNACEAE.

Cornus alternifolia.

Reported by Miss Lucy Braun. Fruit deep blue on reddish stalks.

Cornus florida. Flowering Dogwood.

Common. Very showy in flower. Blossoms in April.

Cornus sericia. Kinnikinnik.

This is Cornus Amomum in the 7th edition of Gray. Lea, Clark, and James.

Cornus paniculata.

Reported by Lea, Clark, and James.

ERICACEAE.

Monotropa uniflora. Indian pipe.

Lea, Clark, James, and Lloyd; also Miss Henrietta Walter. Rare.

PRIMULACEAE.

Samolus floribundus.

This is S. Valerandi var. americanus of Gray's 6th edition. Common. Usually to be found in brooks.

Lysimachia nummularia. Moneywort.

Reported first by C. G. Lloyd, 1891. Now common everywhere.

Lysimachia quadrifolia.

Found by all collectors. Common.

Lysimachia stricta.

Reported in the James catalog. We have no specimen from Hamilton County.

Steironema ciliatum.

Common in low grounds from June to August.

Steironema lanceolatum.

Reported by all collectors.

Anagallis arvensis.

Clark-Buchanan, James, and Lloyd.

Dodecatheon media.

Riddell, Lea, Clark, James, and Aiken. Rare. A plant was sent to the herb. found near Delhi.

EBENACEAE.

Diospyros virginiana. Persimmon.

Lea, Clark, James, and Lloyd. There is a tree growing near the Methodist Home, College Hill. Also several on the Usher property, Mt. Airy.

OLEACEAE.

Fraxinus americana. Ash.

Common thruout the county. A native forest tree. Sometimes the leaves are smooth, at other times pubescent forms are collected.

Fraxinus quadrangulata. Blue Ash.

Lea, Clark, James and Lloyd.

GENTIANACEAE.

Sabbatia angularis.

Lea, Clark, James, and Aiken.

Gentiana Andrewsii. Closed Gentian.

Reported by Lea and Clark. Is probably extinct.

Gentiana flavida.

This is Gentiana alba of the 6th edition. Reported by Miss Lucy Braun.

Frasera carolinensis.

Clark, James, and Aiken. Grows in woods back of Military school.

Obolaria virginica.

Lea, Clark, James, and Aiken. Rare. Gathered back of Military school.

APOCYNACEAE.

Apocynum androsaemifolium. Spreading dogbane.

Clark, Buchanan, Lloyd.

Apocynum cannabinum. Indian hemp.

Lea, Clark, James, and Lloyd.

ASCLEPIDACEAE.

Asclepias incarnata. Swamp milkweed.

Lea, Clark, James, and Lloyd.

Asclepias quadrifolia.

Lea, Clark, James, and Lloyd.

Asclepias syriaca.

This is Asclepias Cornuti of Gray's 6th edition.

Asclepias tuberosa. Butterfly-weed. Pleurisy-root.

Lea, Clark, James, and Aiken.

Asclepias phytolaccoides.
Lea, Clark-Buchanan, James, and Lloyd.

Gonolobus laevis.
Enslenia albida of Gray's 6th edition. Lea, Clark, James, and Lloyd. Common.

Vincetoxicum obliquum.
Reported by C. G. Lloyd, 1891.

CONVOLVULACEAE.

Ipomoea hederacea.
Lea, Clark, and James.

Ipomoea lacunosa.
Lea, Clark, James, and Lloyd.

Ipomoea pandurata.
Lea, Clark-Buchanan, James.

Ipomoea purpurea. Morning glory.
James and Aiken. Very commonly seen in vacant lots as an escape.

Convolvulus arvensis. Bindweed.
Clark-Buchanan, James, and Aiken.

Convolvulus sepium. Hedge bindweed.
Lea, Clark, James, and Lloyd.

Convolvulus spithameus.
Lea, Clark, and James

Convolvulus japonicus.
A garden escape. Reported by Miss Lucy Braun.

Cuscuta arvensis.
Lloyd and Aiken.

Cuscuta compacta.
Reported by Miss Lucy Braun. We do not have this in herb.

Cuscuta Coryli.
Reported by Miss Lucy Braun. We have no specimen in herb.

Cuscuta Gronovii.
Lea and James.

POLEMONIACEAE.

Phlox divaricata. Blue Phlox.
Common. Lea Clark, James, and Lloyd.

Phlox maculata.
Lea, Clark James.

Phlox paniculata.
Lea, Clark, James, and Lloyd.

Polemonium reptans. Greek valerian.
Growing midway between College Hill and Mt. Healthy. Lea, Clark, James, Lloyd.

HYDROPHYLLACEAE.

Hydrophyllum appendiculatum. Water leaf.
Lea, Clark, James, and Lloyd. Common.

Hydrophyllum canadense.

Lea, Clark, James, and Lloyd.

Hydophyllum macrophyllum.

Lea, Clark, James, and Lloyd.

Hydrophyllum virginicum.

Lea Clark, James, and Aiken. This is the rarest of the Hydrophyllums in this locality.

Phacelia bipinnatifida.

Riddell, Lea, Clark, and James.

Phacelia Purshii.

Lea, Clark, James, and Lloyd. Grows near Riverside.

BORAGINACEAE.

Heliotropium indicum.

Clark-Buchanan, James, and Lloyd. Rare. Specimen in herb.

Cynoglossum officinale. Hound's tongue.

Lea, Clark, James, and Lloyd.

Cynoglossum virginianum.

Lea and James.

Lappula echinata.

This is Echinospermum lappula of Gray's 6th edition. James and Lloyd. The plant is a native of Europe.

Lappula virginiana. Beggar's lice.

Lea, Clark, James, and Lloyd. Common.

Mertensia virginica. Lungwort. Blue bells.

Lea, Clark, James and Lloyd.

Lithospermum arvense.

Lea, Clark, James, and Lloyd. Flowers about the middle of April.

Lithospermum latifolium.

Lea, Clark, James and Lloyd.

Echium vulgare.

Sent to the herb. from Milldale.

VERBENACEAE.

Verbena angustifolia.

Miss Peachey, Loveland. Placed on the James list on the authority of D. L. James. Now becoming common.

Verbena bracteosa.

James, 1879; Lloyd, 1891, Aiken, 1905.

Verbena canadensis.

Reported by Miss Lucy Braun. We have no specimen of this in the Lloyd Herb. from Hamilton County.

Verbena hastata. Blue vervain.

Lea, Clark, James, and Miss Henrietta Walter. Grows in damp places.

Verbena stricta. Hoary vervain.

Lea, Clark, James and Lloyd.

Verbena urticaefolia.

Clark, James, and Lloyd. Common.

Lippia lanceolata.

James, Lloyd, Aiken. Grows in creeks.

LABIATAE.

Teucrium canadense. Wood sage.

Lea, Clark, James and Lloyd.

Isanthus brachiatus.

This is I. caeruleus of 6th edition of Gray. Common.

Trichostema dichotomum.

Reported in the James catalog; also by Miss Lucy Braun.

Scutellaria canescens.

Lea Clark, James, and Lloyd. This plant was reported in the addenda of James catalog—1881.

Scutellaria cordifolia.

Lea, Clark-Buchanan, James, and Lloyd.

Scutellaria lateriflora.

Lea, Clark. James, and Lloyd.

Scutellaria nervosa.

Lea, Clark, James, and Lloyd. Specimen in herb.

Marrubium vulgare. Horehound.

Lea, Clark, James and Lloyd.

Agastache nepetoides.

This is Lophanthus nepetoides of the 6th edition. Lea, Clark, James, Lloyd.

Agastache scrophulariaefolia.

Lea Clark, and James.

Nepeta cataria. Cat mint.

Clark, James, and Lloyd.

Nepeta hederacea. Ground ivy.

Clark, James, and Lloyd

Prunella vulgaris. Heal-all.

Lea, Clark, James, and Lloyd. Common along roadsides.

Synandra grandiflora.

Lea, Clark, James, and Lloyd. Growing at College Hill near Military School.

Lamium amplexicaule. Henbit.

Clark, James, and Lloyd

Lamium purpureum.

Reported by Miss Lucy Braun Specimen in herb.

Leonurus cardiaca. Motherwort.

Common Reported by all collectors.

Salvia lyrata. Lyre leafed sage.

Found by Miss Peachy at Loveland.

Monarda didyma.

Clark-Buchanan. We gathered one single specimen 1905. Rare.

Monarda fistulosa.

Lea, Clark, James, and Lloyd.

Blephilia ciliata.

Lea, Clark, 1852. Miss Lucy Braun 1908. Rare.

Blephilia hirsuta.

Lea, Clark, James, and Lloyd.

Hedeoma pulegioides. Mock Pennyroyal.

Lea, Clark, James, and Lloyd.

Melissa officinalis.

James and Lloyd.

Calamintha clinopodium.

Clark, Lloyd; also recorded in the supplement to James catalog.

Pycnanthemum pilosum.

Lea, Clark, James, and Lloyd.

Pycnanthemum virginianum.

This is P. lanceolatum of 6th edition. Lea, Clark-Buchanan, and James.

Lycopus americanus.

This is Lycopus sinuatus of Gray's 6th edition Lea, Clark, James, and Lloyd

Lycopus virginicus. Bugle weed.

Lea, Clark, James, and Lloyd.

Mentha arvensis. Corn mint.

Reported by Miss Lucy Braun. Specimen in herb.

Mentha canadensis.

Lea, Clark, James, and Lloyd.

Mentha citrata.

Miss Lucy Braun. Specimen in herb.

Mentha longifolia.. Horse mint.

Miss Lucy Braun. Specimen in the herb.

Mentha piperita. Peppermint.

Lea, Clark, James, and Lloyd.

Mentha spicata. Spearmint.

Collinsonia canadensis. Rich-weed.

Lea, Clark, James, and Lloyd.

Stachys aspera.

Lea, Clark, and James. This is given in the 7th edition of Gray as Stachys tenuifolia var aspera. Our common species is var glabra, given in the 7th edition as S. tenuifolia.

Stachys cordata.

This is one of Riddell's species. Clark, James, and Lloyd. The large hairs are always jointed, the smaller often crowned with glands or stellular branches.

SOLANACEAE.

Solanum carolinense. Horse nettle.

Lea, Clark, James, and Lloyd.

Solanum nigrum.

Clark, James, and Lloyd.

Solanum rostratum.

Reported by W. H. Aiken. Specimen in herb. The original food of the potato beetle

Physalis angulata.

Reported by C. G Lloyd and Miss Lucy Braun.

Physalis heterophylla.

This is P. virginiana of Gray's Man. ed. 6. Reported by C. G. Lloyd.

Physalis pubescens.

Reported in the James catalog.

Physalis philadelphica.

James catalog and Miss Lucy Braun.

Physalis viscosa.

Lea, Clark, and James catalogs; also reported by Miss Henrietta Walter.

Nicranda physalodes.

James and Lloyd. This plant came into the herb. for identification, 1909.

Lycium vulgare.

Reported in the C. G. Lloyd catalog.

Datura Metel.

According to Dr. Riddell this plant was in cultivation at Pittsburg, and the seed of it was supposed to have been transported to Cincinnati by the river. Clark, James We do not know of this plant growing here at present.

Datura stramonium. Thorn apple.

Clark, James, and Lloyd.

Datura tatula.

Clark and James.

SCROPHULARIACEAE.

Verbasca Blattaria.

Lea, Clark, James, and Lloyd.

Verbascum Thapsus. Common Mullein.

Lea, Clark, James, and Lloyd.

Linaria vulgaris. Toad flax.

Lloyd, Aiken.

Collinsia verna.

Lea, Clark, James, and Lloyd.

Scrophularia marilandica.

Lea, Clark, James, and Lloyd.

Pentstemon laevigatus.

A specimen was brought to the herb. from Westwood of this plant. The var. Digitalis was reported by Miss Lucy Braun from another locality.

Pentstemon hirsutus.

This is P. pubescens of Gray's 6th edition. Lea, Clark, James, Lloyd.

Chelone glabra.

Lea, Clark, and James. It grew at Ross Lake. The species was found growing in Spring Grove 1905 by Miss Lucy Braun. Specimen in herb. Rare.

Paulownia tometosa.

There are several Paulownia trees growing in College Hill. The one in the yard of Mrs. M. B. Avery is probably the largest one in the county. All of these trees are growing in cultivation.

Mimulus alatus.

Lea, Clark, James, and Lloyd. Stem somewhat winged at the angles.

Mimulus ringens.

Lea, Clark, James, and Lloyd. Stem square.

Conobea multifida.

Lea, Clark, James, and Lloyd.

Ilysanthes dubia. False pimpernel.

This is I. riparia of Gray's 6th edition. Lea, Clark, James, Lloyd.

Gratiola virginiana.

Lea, James, and Lloyd.

Veronica arvensis.

Lea, Clark, James, and Lloyd.

Veronica anagallis-aquatica.

Reported by Lea, Clark, and Miss Lucy Braun.

Veronica hederaefolia.

Miss Lucy Braun. We have no specimen of this in the herb. from Hamilton County.

Veronica officinalis.

Reported by Miss Lucy Braun.

Veronica peregrina.

Lea, Clark, James, and Lloyd.

Veronica serpyllifolia.

Lea, Clark, James, and Lloyd. Flowers toward the end of April.

Veronica virginica. Culver's-root.

Lea, Clark, James, and Lloyd.

Seymeria macrophylla. Mullein Foxglove.

Lea, Clark, James, and Lloyd.

Gerardia purpurea.

Reported in the James catalog. We have no specimen of this from Hamilton County.

Gerardia tenuifolia.

Lea, Clark, James, and Lloyd.

Pedicularis canadensis.

Lea, Clark, James, and Lloyd.

Pedicularis lanceolata.

This was found by Mr. T. W. Spurlock. Reported in James catalog.

LENTIBULARIACEAE.

Utricularia gibba.

Reported by Clark.

Utricularia minor.

Reported by Lea and Clark. These plants have not been heard from for some fifty or sixty years. It is probably extinct in Hamilton County.

OROBANCHACEAE.

Epiphegus virginiana.

Lea, Clark, James, and Lloyd. Grows under Beech trees.

Conopholis americana.

Lea, James, and Aiken. A yellowish scaly plant as thick as a man's thumb.

Orobanche uniflora.

Lea, James, Lloyd. This is Aphyllon of Gray's 6th edition. Rare.

BIGNONIACEAE.

Tecoma radicans. Trumpet creeper.

Lea, Clark, James, and Lloyd. Common as an escape.

Catalpa bignonioides.

James catalog.

Catalpa speciosa.

Spontaneous from trees planted by Dr. Warder at North Bend. Fifty thousand of these trees were given by the Mabley, Carew Co., to be planted in and about Cincinnati in 1910.

MARTYNIACEAE.

Martynia louisiana.

This is Martynia proboscidea of Gray's 6th edition. Lea, Clark, James, and Aiken. We did not see the plant, but the pod was brought into the school.

ACANTHACEAE.

Dianthera americana. Water willow.

Lea, Clark, James, and Lloyd.

Ruellia strepens.

Lea, Clark, James, and Lloyd. Quite common.

Ruellia cilosa.

Reported in the James catalog. We have no specimen from Hamilton County.

PHRYMACEAE.

Phryma leptostachya.

Lea, Clark, James, Lloyd. Common.

PLANTAGINACEAE.

Plantago aristata.

Lloyd and Aiken. This is P. Patagonica var aristata Gray's 6th edition.

Plantago lanceolata.

Riddell, Lea, Clark, James, and Lloyd.

Plantago major.

Lea, Clark, James, and Lloyd. Altho this plantain has been recorded, it is very questionable whether it occurs in Hamilton County. With P. major the capsule is ovoid and is circumscissile near the middle; all that we have seen should be Plantago Rugelii.

Plantago Rugelii.

This is common everywhere. Capsules circumscissile much below the middle.

Plantago virginica.

Reported by C. G. Lloyd.

RUBIACEAE.

Sherardia arvensis.

Reported by Aiken in check list of Hamilton County plants. Found growing in the yard of the Presbyterian Church, 1908. Rare. Probably in grass seed.

Galium aparine.

Lea, Clark, James, and Lloyd.

Galium circaezans. Wild liquorice.

Lea, Clark, James, and Lloyd.

Galium concinnum.

Reported in the addenda of Davis L. James to the James catalog by Mr. C. G. Lloyd. The species is very common in our woods at present. 1880-1910.

Galium triflorum.

Clark, James, and Lloyd.

Galium trifidum.

Riddell, Clark-Buchanan, James, and Lloyd.

Galium verum.

Reported by Miss Lucy Braun. New to Hamilton County flora.

Spermacoe glabra.

Reported to the Supplement of James catalog by Mr. C. G. Lloyd.

Diodia teres.

Reported as growing near the Country Club; also found by Mr. Max Braam, of Hughes High School, near the Cincinnati University. Rare.

Mitchella repens.

Lea, Clark, and James. We would be glad to see a specimen of this from Hamilton County.

Cephalanthus occidentalis.

Lea, Clark, James, and Lloyd. There was a fine specimen growing on the Orville Simpson property, College Hill, but the locality has been destroyed by the railway track cutting the corner of the lot.

Houstonia caerulea. Bluets.

Lea, Clark, James, and Lloyd.

Houstonia ciliolata.

This is var. of H. purpurea. Lea, James, and Aiken. Basal leaves ciliate.

Houstonia longifolia.

This is H. purpurea var longifolia. Lea, Clark, and James. Leaves smooth. Specimen in the Herb. of Ohio State University from Hamilton County.

Houstonia purpurea.

Lea, Clark, and Lloyd.

CAPRIFOLIACEAE.

Lonicera Sullivantii. Yellow Honey suckle.

James catalog. We have no specimen of this from Hamilton County.

Symphoricarpos racemosus. Snowberry.

Naturalized. C. G. Lloyd.

Symphoricarpos vulgaris. Indian currant.

Lea, Clark, James, and Lloyd. Reported also by Mr. D. L. James.

Symphoricarpos occidentalis.

This is reported by Miss Lucy Braun. We do not have this from Hamilton County.

Triosteum angustifolium. Horse gentian.

Lea, Clark, James, and Lloyd. Grows at College Hill.

Triosteum perfoliatum.

Lea, Clark, and James. This is a rare plant.

Virburnum acerifolium.

This was reported in the James catalog. It grew near Kirby road on the way to College Hill. Rare.

Virburnum prunifolium. Black Haw.

Lea, Clark, James, and Lloyd.

Viburnum rufotomentosum.

Reported by Miss Lucy Braun. It is very similar to V. prunifolium. Lower leaf surface red-tomentose.

Sambucus canadensis. Elder

Clark, James, and Lloyd. Fruit, black-purple. Pith of the plant white.

VALERIANACEAE.

Valeriana pauciflora.

Lea, Clark, James, and Lloyd. There was a locality near the Wesleyan Cemetery in 1908. Rare.

Valerianella locusta.

Reported by Miss Lucy Braun. We have no specimen of this from Hamilton County in herb.

Valerianella radiata.

Lea, Clark, and James. A rare plant.

DIPSACACEAE.

Dipsacus sylvestris. Teasel.

Clark, James, and Lloyd. Common everywhere.

CUCURBITACEAE.

Sicyos angulatus. Bur cucumber.

Lea, Clark, James, and Lloyd. Quite plentiful along the Little Miami.

Echinocystis lobata. Wild Balsam apple.

James catalog.

CAMPANULACEAE.

Specularia perfoliata.

Lea, Clark, James, and Lloyd.

Campanula americana. Tall Bellflower.

Lea, Clark, James, and Lloyd. Common.

Campanula aparinoides. Marsh bellflower.

Lea, Clark, and James. Rare. Resembles a Galium. There is a specimen in the herb. of the Ohio State University from Hamilton County.

Campanula rapunculoides.

Reported in the James catalog. Rare. Specimen in the herb. of Ohio State University.

LOBELIACEAE.

Lobelia cardinalis. Cardinal Flower.

Lea, Clark, James, and Aiken. A single specimen found.

Lobelia inflata. Indian tobacco.

Lea, Clark, James, and Lloyd. Common.

Lobelia leptostachys.

Listed in the James catalog. We have no specimen from Hamilton County.

Lobelia spicata.

Lea, Clark, and James Found growing at Branch Hill.

Lobelia syphilitica.

Lea, Clark, James, and Lloyd. Common.

COMPOSITAE.

Vernonia fasciculata. Iron weed.

Lea, Clark, James, and Lloyd. Common in open fields.

Elephantopus carolinianus. Elephant's foot.

Lea, Clark, and James.

Eupatorium ageratoides. White snake root.

Lea, Clark, James, and Lloyd. E. urticaefolium of Gray's 7th edition.

Eupatorium altissimum.

Reported by Miss Lucy Braun. Specimen in herb.

Eupatorium coelestinum. Mist flower.

Lea, Clark, James, and Lloyd. Grows back of Military school, College Hill.

Eupatorium perfoliatum. Boneset.

Lea, Clark, James, and Lloyd.

Eupatorium purpureum. Joe-Pye Weed.

Lea, Clark, James, and Lloyd. Open woods. Common.

Eupatorium serotinum.

Reported by Miss Lucy Braun.

Eupatorium sessilifolium. Upland boneset.

Lea, Clark, and Miss Lucy Braun.

Kuhnia eupatorioides L.

Miss Lucy Braun near Robinson's Station. Specimen in herb.

Grindelia squarrosa.

Collected by W. H. Aiken back of the residence of J. Wilder, College Hill. Specimens were sent to the Agr. Exp. Station, Wooster, O., also to the herb. of Ohio State University. The seed probably came in grass seed which had been brought from the West.

Solidago caesia.

Lea, James, Clark, and Lloyd.

Solidago canadensis.

Lea. Clark, James, and Lloyd. Our most common species.

Solidago graminifolia.

Lea, Clark, James, and Lloyd. This is S. lanceolata of 6th edition.

Solidago latifolia.

Lea, Clark, James, and Lloyd. Common.

Solidago nemoralis.

Lea, Clark, and Miss Lucy Braun. The plant of Miss Braun is growing in cultivation.

Solidago patula.

Lea, Olark, and James. We have no specimen from Hamilton Oounty.

Solidago serotina.

Lea, Olark, James, and Lloyd.

Solidago ulmifolia.

Lea, Clark, James, and Aiken. Specimen at Ohio State University from Hamiltoı County.

Aster cordifolius.

Lea, Olark, James, and Lloyd.

Aster divaricatus.

This is Aster corymbosus of Gray, 6th ed. Olark-Buchanan, James, and Lloyd.

Aster ericoides var villosus.

James and Lloyd. Now common—1910.

Aster lateriflorus.

This is Aster diffusus of Gray's 6th ed. Lea, Olark, James, and Lloyd.

Aster Lowrieanus.

This species resembles A. cordifolius—Aiken.

Aster macrophyllus.

Lea, Olark, and James.

Aster novae-angliae.

Lea, Olark, James, and Lloyd.

Aster paniculatus.

Lea and Lloyd.

Aster patens var phlogifolius.

Clark, James, and Aiken.

Aster prenanthoides.

Lea, Olark, James, and Lloyd.

Aster puniceus. Red stalked aster.

Lea, Olark, and James.

Aster Shortii.

Lea, Clark, and Lloyd.

Aster sagittifolius.

Lea, Olark, and James.

Aster vimineus.

Gathered by W. H. Aiken; identified by Prof. A. D. Selby of Agr. Exp. Sta., Wooster, O.

Erigeron annuus.

Lea, Clark, James, and Lloyd.

Erigeron canadensis.

Lea, Clark, James, and Lloyd. Common everywhere.

Erigeron philadelphicus.

Clark, James, and Lloyd.

Erigeron pulchellis.

This is E. bellidifolius of Gray's 6th ed. Lea, Olark, James, Aiken.

Erigeron ramosus.
This is E. strigosus of Gray's 6th ed. Lea, Clark-Buchanan, James, and Lloyd.

Antennaria plantaginifolia.
Lea, Clark, James, and Lloyd.

Gnaphalium polycephalum. Common everlasting.
Lea, Clark, James, and Lloyd.

Gnaphalium purpureum. Purplish cudweed.
Riddell, Lea, Clark, James, and Lloyd.

Gnaphalium ulignosum.
Lea, Clark, James, and Lloyd.

Inula helenium. Elecampane.
Lea, Clark, and James.

Polymnia canadensis.
Lea, Clark, James, and Lloyd. This plant is clammy-hairy.

Polymnia uvedalia.
Lea,. Clark, James, and Lloyd. Plant is roughish hairy.

Silphium perfoliatum.
Lea, Clark, James. and Lloyd.

Silphium terebinthinaceum.
Lea, Clark, and James.

Silphium trifoliatum.
Lea, Clark, James, and Lloyd.

Ambrosia artemisiaefolia.
Lea, Clark, James, and Lloyd.

Ambrosia trifida.
Lea, Clark, James, and Lloyd.

Xanthium canadense. Cocklebur.
Reported by C. G. Lloyd. Miss Lucy Braun.

Xanthium spinosum.
James and Lloyd.

Heliopsis laevis.
Reported in the Lea catalog; also by Miss Henrietta Walter.

Heliopsis scabra.
Reported in the James catalog.

Eclipta alba.
Lea, Clark, James, and Lloyd.

Rudbeckia hirta.
Lea. Clark, James, and Lloyd.

Rudbeckia lacinata.
Lea, Clark, James, and Lloyd.

Rudbeckia triloba.
Lea, Clark, James, and Lloyd.

Lepachys pinnata.
Lea and James. Rare.

Helianthus annuus. Sunflower.

Listed in the James catalog. A very common escape all over the county.

Helianthus divaricatus.

Lea, Lloyd, and Aiken.

Helianthus giganteus.

Clark and Lloyd. Stem hairy or scabrous.

Helianthus grosseserratus.

Miss Lucy Braun. Very close to H. giganteus.

Helianthus hirsutus.

Lea, Clark, and James.

Helianthus strumosus.

Lea, Clark, and Lloyd.

Helianthus tracheliifolius.

Reported by Miss Lucy Braun. Similar, in some respects, to H. strumosus.

Actinomeris alternifolia.

This is A. squarrosa of Gray's 6th ed. Lea, Clark, James, and Lloyd.

Coreopsis tripteris.

Lea, Clark-Buchanan, and James.

Bidens bipinnata.

Lea, Clark, James, and Lloyd.

Bidens connata. Swamp Beggar-ticks.

Lea, Clark-Buchanan, James, and Lloyd.

Bidens frondosa. Stick-tight.

Lea, Clark, James, and Lloyd.

Bidens laevis.

This is B. chrysanthemoides of Gray, 6th ed. Lea, Clark, James, and Lloyd.

Bidens trichosperma.

James and Lloyd. This is Coreopsis trichosperma of Gray's 6th ed. Found on the canal near the Workhouse by Mr. Spurlock.

Galinsoga parviflora.

Lloyd. Common everywhere—Aiken.

Helenium autumnale.

Lea, Clark, James, and Lloyd.

Dysodia papposa.

This is D. chrysanthemoides of Gray's 6th ed. James and Lloyd.

Achillea millefolium.

Lea, Clark, James, and Lloyd.

Anthemis cotula.

Clark, James, and Lloyd.

Matricaria discoidea.

This was found near Loveland—1884—introduced probably from California. It had been previously recorded from one or two localities in the eastern section of the county. This is M. suaveolens in the 7th ed. of Gray.

Chrysanthemum leucanthemum. Ox-eye daisy.

Clark, James, and Lloyd.

Tanacetum vulgare. Tansy.

Reported in the James catalog; is sometimes seen as an escape.

Artemisia annua.

Reported by C. G. Lloyd.

Artemisia biennis.

Lea, Clark, James, and Lloyd.

Artemisia vulgaris.

James, Lloyd. Quite common near the Riverside school.

Erechitites hieracifolia.

Lea and Clark.

Cacalia atriplicifolia.

Clark, James, and Lloyd.

Cacalia reniformis.

Lea, Clark, James, and Lloyd.

Cacalia suaveolens.

Lea, Clark, and Miss Lucy Braun. A rare plant.

Senecio aureus.

Riddell, Lloyd, and Miss Lucy Braun.

Senecio obovatus.

Lea, Clark, James, and Aiken.

Senecio aureus var gracilis.

This species is reported by Riddell as growing seven miles north of Cincinnati.

Arctium lappa. Great Burdock.

Clark, James, and Lloyd.

Cirsium altissimus.

Lea, Clark, James, and Aiken.

Cirsium arvensis.

James and Lloyd.

Cirsium discolor.

Lea, Clark, James, and Lloyd.

Cirsium lanceolata.

James and Lloyd.

Onopordon acanthium.

James and Lloyd. Very common on the hills about Cincinnati—Aiken.

Krigia amplexicaulis.

Lea, Clark, James, and Aiken.

Cichorium intybus.

James and Aiken. Roadsides in the vicinity of White Oak.

Picris echioides.

Reported by Miss Lucy Braun. Specimen in the herb.

Taraxacum erythrospermum. Red seeded dandelion.

Miss Lucy Braun and W. H. Aiken. Specimen in herb. Noticed since 1905.

Taraxacum officinale. Dandelion.

Clark, James, and Lloyd. Common everywhere.

Sonchus arvensis.

This weed seems to have become common since 1895—W. H. Aiken.

Sonchus asper. Spiny leaved sow-thistle.

James and Lloyd.

Sonchus oleraceus. Sow-thistle.

James and Lloyd.

Lactuca canadensis.

James and Lloyd.

Lactuca floridana.

Lea, Clark, James, and Miss Braun.

Lactuca saligna.

Our attention was called to the presence of this weed in our midst by Prof. A. D. Selby of the Agr. Exp. station, Wooster, O.

Lactuca scariola.

Lloyd and Aiken. One of our worst and commonest weeds.

Lactuca spicata.

This is Lactuca leucophaea of Gray's 6th edition. Lea, Clark, and James.

Lactuca villosa.

This is L. acuminata of Gray's 6th edition. Lea, Lloyd, and Clark.

Crepis runcinata.

Reported by Miss Lucy Braun.

Prenanthes alba.

Lea, Clark, and James.

Prenanthes altissima.

Lea, Clark, James, and Lloyd.

Prenanthes crepidinea.

Lea, Clark, and James.

Prenanthes virgatus.

Reported by Miss Lucy Braun.

Prenanthes trifoliatus.

Reported by Miss Lucy Braun.

Hieracium scabrum.

Lea, Clark, James, and Lloyd.

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CINCINNATI, OHIO

BOTANY SERIES, No. 2

Reise
durch einige der mittlern und südlichen
Vereinigten
Nordamerikanischen Staaten
nach Ost-Florida und den Bahama Inseln
unternommen in den Jahren 1783 und 1784
von
Johann David Schöpf

Erlangen
bey Johann Jacob Palm, 1788

Publications Issued by The Lloyd Library

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No. 3. Mycological Series No. 1.
The Genera of Gastromycetes, by C. G. Lloyd.

No. 4. Pharmacy Series No. 1.
References to Capillarity to the end of the year 1900, being Chapter VII of "A Study in Pharmacy," by John Uri Lloyd.

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The Geastrae, by C. G. Lloyd.

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Materia Medica Americana, Potissimum Regni Vegetabilis, by Johannes David Schoepf, 1787.

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An account of some of the vegetable productions naturally growing in this part of America, botanically arranged by the Rev. Manasseh Cutler.

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The Lycoperdaceae of Australia, New Zealand, and Neighboring Islands, by C. G. Lloyd.

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Travels through the interior parts of North America in the years 1766, 1767, and 1768, by J. Carver.
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Hydrastis Canadensis.

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Life and medical discoveries of Samuel Thomson and a history of the Thomsonian Materia Medica.

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The Eclectic Alkaloids, Resins, Resinoids, Oleo-Resins, and Concentrated Principles, by John Uri Lloyd.

No. 13. Mycological Series No. 4.
Synopsis of the Known Phalloids, by C. G. Lloyd.

No. 14. Mycological Series No. 5.
Synopsis of the Genus Hexagona, by C. G. Lloyd.

No. 15. Botany Series No. 1.
Catalogue of the Ferns and Flowering Plants of Cincinnati, Ohio, and Vicinity, by W. H. Aiken.

No. 16. Botany Series, No. 2.
Reise durch einige der mittlern und sudlichen vereinigten Nordamerikanischen Staaten nach Ost-Florida und den Bahama Inseln unternommen in den Jahren 1783 und 1784, von Johann David Schopf, Erlangen, bey Johann Jacob Palm, 1788.

Bibliographical Contributions from the Lloyd Library

No. 1. Catalogue of the Periodical Literature in the Lloyd Library.

Mycological Writings of Mr. C. G. Lloyd

Mycological Notes, No. 1 to No. 36, 1898-1910.
Mycological Notes, Old Species Issue, No. 1, 1908.
Mycological Notes, Polyporoid Issue, No. 1 to No. 3, 1908-1910.
Letters, No. 1 to No. 28, 1904-1910.
A Compilation of the Volvae of the United States, 1898.
The Genera of the Gastromycetes, 1902.*
The Geastrae, 1902.*
The Lycoperdaceae of Australia, New Zealand, and Neighboring Islands, 1905.*
The Tylostomeae, 1906.
The Nidulariaceae, 1906.
The Phalloids of Australasia, 1907.
Synopsis of the Known Phalloids, 1909.*
Synopsis of the Genus Hexagona, 1910.*
Synopsis of the Sections Microporus, Tabacinus, and Funales of the Genus Polystictus, 1910.

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* Published also as a Bulletin of the Lloyd Library of the Mycological Series.

Introduction.

Dr. Johann David Schoepf, b. Wunsiedel, Bavaria, March 8, 1752; received his degree in medicine from the University of Erlangen in 1776; appointed surgeon to the Ansbach troops, arriving at New York, June 4, 1777; for six years in the hospitals of New York, Philadelphia, and Rhode Island; d. September 10, 1800, President of the United Medical Colleges of Ansbach and Bayreuth.*

Leaving New York as soon as possible after the war, in July, 1783, Dr. Schoepf set out upon his travels to the South. After ten days in Philadelphia, he visited Bethlehem and Nazareth, and thence crossed Pennsylvania to Pittsburg, in a two-wheeled chaise. His route lay through the Wyoming Valley, by Reading, Lebanon, and Carlisle. Returning he took the southern road, to the Potomac, through Georgetown, Alexandria, Annapolis, and Baltimore. He was at Philadelphia a second time October 31, 1783. This is the region covered by his first volume.

Towards the end of November, 1783, he left Philadelphia and passed through Maryland into Virginia; from Richmond he made an excursion to Yorktown. Thence following the coast he arrived at Charleston in February. March 9, 1784, he sailed for St. Augustine, and on the 29th of that month crossed to the Bahama Islands. He set sail for England June 7, 1784.

Schoepf was the first naturalist to traverse so much of the United States during the year following the Peace of 1783. Therefore, in the extracts here given, it has been thought well to include something of his observations touching the economic aspects of the subject. Dr. Schoepf was a particularly well-informed man of science, of a wide range of interests, and it may be added that his *Beyträge zur mineralogischen Kenntnis des östlichen Theils von Nord America* is regarded as the first work on American Geology.¶ His *Travels*, a rare book, have been translated for the first time into English by Alfred J. Morrison, from the copy in the Library of Congress. These extracts have been supplied by the translator, at the request of Dr. John Uri Lloyd.

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*cf. 1. Kremers, Introd., *Materia Medica Americana* (*Schoepf*), Lloyd Library Bulletin. 2. Hirsch, *Biographisches Lexikon der hervorragenden Aerzte aller Zeiten und Völker* 3. Fr Ratzel, in *Allgem. Deutsche Biographie*. 4 Rosengarten, *The German Soldier in the Wars of the United States*, 2nd ed., pp. 91-98.

¶cf. George P. Merrill, *Contributions to the History of American Geology*, Smithsonian Institution Report (Nat. Museum) 1904, p. 208.

Pensylvania.

[I, 115-138.] Dr. **Benjamin Rush** is the Professor of Chymistry, [University of Pennsylvania Medical Faculty], and is a very favorite practicioner—a man whose agreeable manners, oratorical fluency, and flowery style abundantly recommend him to his fellow-countryman. He is the author of several opuscula of a medical nature, but also appears frequently as a political writer. Several sheets of his on the newest methods of inoculating for the smallpox and of treating that disease have appeared recently in a German translation. During the war he was for a time Physician-in-chief of the American army and frequently had occasion to observe the fatal course of lockjaw in cases of insignificant wounds, although opium was administered heavily. This led him to the opinion that the cause might be found in an extreme weakness of the body. Therefore his treatment was to administer Peruvian bark and wine, at the same time making incisions in the wound and applying a blister of Spanish fly. Results were incomparably better. He intends himself to publish, with other material, his observations and conclusions in this matter, unless publication of them is managed earlier in some other way. The idea is confirmed by comparisons made between the wounded of the two armies, British and French, after the siege of York in Virginia. Most of the wounded in the French army, but especially those of West India regiments, were attacked with the lockjaw and died, although their injuries may have been slight, whereas, in the British hospitals a fatal outcome was seldom remarked. It is a known fact that soldiers from the West Indies always show a weak state of health, and the remainder of the French troops, (having made in the height of summer a long and tedious march from New England to Virginia), must have been in a weakened condition. Lockjaw was not frequently the case at Philadelphia, and was as seldom seen at New York, among the British troops.

Some time ago an Irish woman made several fortunate cures of blood-spitting by the use of common kitchen salt. She recommended for patients suffering with this malady a teaspoonful of salt every morning, to be gradually increased to a tablespoonful several times a day. In the more positive cases of blood-spitting, several doses must be given, often repeated until the symptoms cease, which will unfailingly happen in a short time, it is claimed. Dr. Rush about thirty years ago learned of this treatment, and has made use of it since in more than thirty cases. and invariably with good results. The cure is effectual also in bleedings at the nose and in floodings, but is excellent for blood-spitting. Only in two cases was there no good effect, to-wit, with a man who was an old and incorrigible drinker, and with another who from distrust of so simple a means would not take the salt in sufficient quantity. Something similar has been long known respecting saltpetre and sal-ammoniac, but these being not so generally at hand, the practice with kitchen salt deserved mention.

The French physicians and surgeons, here as well as in the West Indies, were very much disinclined to give bark in cases of intermittent fever. The Americans were always sooner done with their patients, whereas the French showed a preference rather for enfeebling theirs to the skeleton point; finally, indeed, brought them round, but very slowly and at the risk of frequent relapses and stoppages of the bowels—sequelae of long-standing fevers very much more certain to occur if bark is not given in time. Dr. Rush learned of a quack doctor the use of blistering plasters for obstinate cold fevers or agues, and his experience convinced him of the value of the treatment. The blisters are applied to both wrists and seldom fail of effect. (Several bands about the hand have long been used by our German country people.) Dr. Rush in this way cured a Virginia doctor of a tertian which he had been dragging about for three months, and he in turn used the treatment in Virginia with good results. . . .

Dr. **Kuhn,** of German origin, is the Professor of Botany and Materia Medica. He is a disciple of the lamented Linnaeus, who named an order of plants in his honor, the *Kuhnia*—which Dr. Kuhn himself has not seen, although it exists in Pensylvania. The professorship of Botany is an empty title, since throughout the summer there is neither lecturing nor botanizing. . . .

I should tax the patience of my readers by an enumeration of all the Aesculapians and learned men of Philadelphia, where the labors of the physician are as richly rewarded as at any place. The yearly in-take of more than one of these men is reckoned at several thousand pounds Pensyl. Current. But their greatest profit arises from the private dispensation of remedies;* to which end each physician of large practice has a select stock of drugs and keeps a few young men at hand to prepare prescriptions and assist in visiting patients. By private reading or academical instruction, these young men contrive to increase their knowledge and so fit themselves for practice on their own account.

. . . Mr. **du Sumitiere,** of Geneva, a painter, is almost the only man at Philadelphia who manifests a taste for natural history. Also he possesses the only collection, a small one, of natural curiosities—and a not inconsiderable number of well-executed drawings of American birds, plants, and insects. It is to be regretted that his activities and his enthusiasm for collecting should be embarrassed by domestic circumstances, and that he should fail of positive encouragement from the American public.

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During the first days of my stay at Philadelphia I visited among others Mr. **Bartram,** the son of the worthy and meritorious botanist (so often mentioned by Kalm) who died six years ago at a great age. Bartram the elder was merely a gardener, but by his own talents and industry, almost without instruction, became the first botanist in America, honored with their correspondence by Linnaeus, Collinson, and other savans. He was, to be sure, more collector than student, but by his enthusiasm and love for plants, many new ones were discovered. He made many long journeys on foot through the mountain country, through several of the provinces, and (with Kalm and Conrad Weisser) into the interior of Canada. After the Peace of 1762 when both the Floridas were apportioned to Great Britain, Bartram received a commission from the King to visit those two provinces. Contrary to his own purpose his journal was published, but Bartram should not be judged by that dry record. Whoever wishes more information regarding him may find it in Hector St. John's Sketches of American Manners. The Bartram garden is situated on an extremely pleasant slope across the Schuylkill and not far from its junction with the Delaware. An old but neat house of stone, on the river side, supported rather than adorned by several granite pillars, was the residence of this honored and contented old man. The son, the present owner of the garden, follows the employments of his father and maintains a very respectable collection of sundry North American plants, particularly trees and shrubs, the seeds and shoots of which he sends to England and France at a good profit. He is not so well known to the botanical world as was his father, but is equally deserving of recognition. When young he spent several years among the Florida Indians, and made a collection of plants in that region; his unprinted manuscript on the natives and products of that country should be instructive and interesting. In the small space of his garden there is to be found assembled really a great variety of American plants, among others, most of their vines and conifers, species of which very little is generally known. The Sarracenia and several other marsh growths do very well here in dry beds—confirmation of what I have often observed with astonishment, namely, that American plants grow anywhere, with little or no reference to the place of their origin.*

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*There are besides several apothecarys and dealers in drugs at Philadelphia—among others a German shop, where the Pennsylvania-Dutch farmer, to his great comfort, is supplied all the silly doses he has been accustomed to in the fatherland.

Nearer to Philadelphia, but also on the farther bank of the Schuylkill, there lives a botanist who is the equal of Bartram neither in knowledge nor spirit, although he makes more ado—Mr. **Young,** by birth a Hessian, who in a strange way has gotten to himself the title of Botanist to the Queen. His father lived at this same place, by what he could make on his bit of land; the son was frequently in Bartram's garden and found amusement in the variegated blossoms. One day (so I was told at Philadelphia) he sent to London a paquet of plants which he had collected in the garden, with a letter addressed **To the Queen.** He had placed the paquet unobserved in the bag which is usually kept open at the Coffee-house by ships shortly to clear. Arrived at London the skipper was in a quandary whether to deliver the paquet, of which he knew nothing, what it contained or who had sent it; but after consultation with his friends despatched it as directed. The Queen, supposing this to be an extraordinarily hopeful lad, had the youthful Young brought to London and placed under the care of the celebrated Dr. Hill. Three hundred pounds sterling was appropriated annually for his use, and after a time Young came back to America, with the title, a large peruque and a small stipend, and fulfilled none of the hopes he had aroused. Some years ago, indeed, he had printed at Paris an exhaustive catalogue of plants presumably in his garden; but I found that his garden is very extensive—if this or that plant of the catalogue is not to be found in his garden he answers with his customary bombast that all America, field and forest, is his garden.*

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*Since my return I have seen American trees and shrubs more than once, in England and Germany, thriving on dry soils, whereas in America it had been my observation that these varieties were to be found only in swampy places.

The taste for gardening is, at Philadelphia as well as throughout America, still in its infancy. There are not yet to be found many orderly and interesting gardens. Mr. Hamilton's, near the city, is the only one deserving special mention. Such neglect is all the more astonishing, because so many people of means spend the most part of their time in the country. Gardens as at present managed are purely utilitarian. Pleasure gardens have not yet come in, and if perspectives are wanted one must be content with those offered by the landscape, not very various, what with the still immense forests. The fruitful warmth of the climate obviates indeed very many difficulties which we have to contend with in securing garden growths—and makes careless gardeners. So long as people are content merely with the customary products of northern Europe, these may be had at small pains; but with this management the advantages are lost which would be afforded by a better, that is to say, many of the products natural to a warmer climate might be had with a little care. Most of the vegetables and flowers of northern Europe have been introduced. Many of these do well and have even been improved, but others grow worse under careless management. American gardening has nothing of the characteristic to show, beyond several varieties and dubieties of pumpkins, squashes, and gourds, the cultivation of which was usual among the Indians. Several of our vegetables were first introduced by the German troops, *e. g.*, Kohlrabi, broccoli, and the black radish. But certain of our good fruits are lacking (or at least very seldom seen, and then not the best sorts), such as, plums, apricots, walnuts, good pears, the domestic chestnut, gooseberries, and others, and for no other reason but neglect to make the proper efforts, with patience and attention—for the American cares little for what does not grow of itself, and is satisfied with the great yields of his cherry, apple, and peach trees, without giving a thought to possible and often necessary betterments. They know little or nothing of grafting, or inoculations, or use such practices very seldom. Much, without sufficient ground, is charged to the disadvantages of the climate, and people have let themselves be too easily frightened away from gardening, when the trouble was that nothing of the first quality has been produced, because of thin soil, bad seed, and unskillful cultivation.

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* Recently Mr. Humphrey Marshall has made himself known by his American Grove, or alphabetical list of all North American trees and shrubs, published at Philadelphia in 8 vo. 1785. He lives in Pensylvania, in Chester County, and offers to furnish at a moderate price collections of seeds or of living plants noticed in his catalogue.

The taste for garden flowers is likewise very restricted; however, a few florists are to be found. Dr. Glentworth, formerly a surgeon in the army, has a numerous collection of beautiful bulbs and other flowers which he maintains by yearly importations from Holland. But as a rule one finds in the gardens nothing but wild jasmine, flower-gentles, globe-amaranths, hibiscus syriacus, and other common things. The beautiful gilliflower, the ranunculus, auricula, etc., of these they are little aware.

[I, 239-241.] All the hills about [Nazareth to Schöneck], as far as the eye could reach, were grown up with the bush oak (Quercus nana, Dwarf oak).* Only here and there stood a chestnut, quite alone, or one of the other oaks. We overlooked in part and in part passed through some thousands of acres of land bearing nothing but this description of oak. Their twisted and bushy stems seldom exceeded a height of three to four feet; at times we observed trees of ten to twelve feet, or even fifteen feet, but very few of them. These oaks seem to take possession of this dry and infertile hill country as if by privilege. And there is found among them besides scarcely any variety of other plants. We noticed only the *Actæa racemosa* (which we missed hardly anywhere along the whole road), the *Galega virginiana, Sophora tinctoria, Gerardia,* and a few others, along with a dry bristly grass. In the lower valleys between these hills the other oaks occur, as also the chestnut oak which is seldom seen elsewhere in this region. The land grown up in this dwarf oak is of very little value. The people living near by set fire to the bush every spring, in order to give air to the grass beneath, and so furnish their cattle a little pasture. However, the growth comes out again, although the bark is almost coaled. Fire seems to do them little hurt, whereas the chestnut and other tree-oaks stand among them dry and scorched.

[I, 347-348.] The blue magnolia or mountain magnolia (*Magnolia acuminata, Linn.*) was one of the more conspicuous trees peculiar to this mountain region [near Bedford]. They call it here the cucumber tree, because its long cones, before they ripen and open, are in shape something like that fruit. The seeds, seed-receptacles, and in less degree the bark and twigs have in common with other magnolias a very pleasant bitterness of taste, and the seeds are often used in bitter spirituous infusions. This tree is distinguished from its relatives by its habitat; it is found only in dry spots in the mountains, and bears more cold than other magnolias. The ripe-seed vessels have a pleasant odor and taste something like the calamus. The unripe fruit blackens the fingers and stains the knife.

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* This bush oak was similar to that growing on Long Island and called *Qu. Ilicifolia* by Von Wangenheim Vid his *Amerikanische Holzarten* p. 79). Marshall, in his *American Grove*, calls it Dwarf black oak (*Quercus nigra pumila*). But Marshall makes dwarf varieties of almost every kind of oak, according as it is a growth of poor, thin soil. Thus he has a Quercus alba minor, Barren white oak. Quercus rubra nana. Dwarf Barren oak. Quercus prinus humilis, Dwarf Chestnut or Chinquapin Oak. In this way there might be dwarf varieties of every sort of tree, whereas there is a lack of nourishment in the soil—and the question may still be put wherever this oak is an independent variety.

[I, 362-363.] A man met us who was taking to Philadelphia some five hundred pounds of ginseng-roots (*Panax quinquefolium, L,*) on two horses. He hoped to make a great profit because throughout the war little of this article was gathered, and it was now demanded in quantity by certain Frenchmen. The hunters collect it incidentally in their wanderings; in these mountains the plant is still common, but in the lower parts it has pretty well disappeared. It grows in not too rich woods-earth in mountain regions from Canada down to North and South Carolina. Much is brought in to Fort Pitt. Industrious people who went out for the purpose have gathered as much as sixty pounds in one day. Three pounds of the freshly gathered make only one pound of the well dried; which is sold by the gatherers for one, one and a half, to two shillings, Pensylv. Current, commonly about a shilling sterling. The physicians in America make no use of this root; and it is an article of trade only with China, where the price is not so high as it was, on account of the great adulteration. All manner of similar roots were mixed in. The English take very little of it. The taste of the fresh root is very similar to that of our sweetwood or liquorice, but is somewhat more aromatick. In these mountains also are gathered many pounds of the Senega (*Polygala Senega, L.*) and of the Virginia snake-root (*Aristolochia Serpent. L.*).

[I, 415-420.] In several excursions beyond the Alleghany we had occasion to observe the goodness and riotous fertility of the soil in its original and undisturbed character. The indigenous plants had a lusty, fat appearance, and they grow vastly stronger and to greater heights than is their habit elsewhere. In a new-made and unmanured garden there stood stalks of the common sun-flower, which were not less than twenty feet high, measured six inches in diameter, and were almost ligneous. The forests were of chestnut, beech, sassafras, tulip-trees or poplars, wild cherry, red maple, sugar maple, black walnut, hickory and its varieties, several sorts of oak, the sour gum, the liquid amber or sweet gum, and other trees known along the coast but here growing still finer and stronger. The forests are for the most part quite clear of undergrowth, which is equally fortunate for the hunter and the traveler. We were shown several trees described as of an unknown species, which appeared quite like the *Gleditsia triacanthos,* but had no thorns. Among the somewhat rarer trees are to be reckoned the papaws,* which chiefly grow in moist, rich, black soil, often called after them, "papaw soil." They are slender trees, with a smooth, white bark, and beautifully leaved. Their smooth, egg-shaped fruit when over-ripe is not at all unpleasant, but by no means to every one's taste. The fruit has an odor of pineapples, but the bark and leaves a disagreeable, repulsive smell.

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* **Annona glabra. Gron. Virg. p. 83. Annona fructu lutescente lævi, &c. Catesby II. 85?**

The sugar-maple is largely used by the people of these parts, because the carriage makes the customary sugar too dear for them. The tree grows more numerously here in the mountains than in the country nearer the coast; and one sees now and again in the woods gutters and troughs by means of which the sap is collected. The Indians also are known to make use of the sugar, and they boil it down on the spot. Others prepare it for sale at one and a half to two shillings Pensylv. the pound. It is brown, to be sure, and somewhat dirty and viscous, but by repeated refinings can be made good and agreeable.* A domestic tea is prepared from the leaves of the Redroot (*Ceanothus americana*), which is really not bad to drink, and may well take its place along with the inferior sorts of Bohea tea. Jonathan Plummer in Washington county on the Monongahela during the war prepared, himself, more than one thousand pounds of this tea, and sold it for seven and a half to ten Pensylv. shillings the pound. His method of preparation he kept secret; probably he dried the leaves on or in iron-ware over a slow fire. By better handling, more careful and cleanly, this tea could likely be made greatly more to the taste than it is. At the beginning of the war, what with general prohibitions and the enthusiastic patriotism, the importing of Chinese tea was for some time rendered difficult, and attempts were made everywhere to find substitutes in native growths; this shrub was found the most serviceable for the purpose, and its use is still continued in the back parts. Along the coast this patriotic tea was less known and demanded, but it will soon banish from many houses in the mountains the foreign tea which is now become cheaper. The use of tea is everywhere quite common.

Besides the elsewhere commonly known sorts of wild American grape-vines, there is found on the lower sandy banks of the Ohio a particular vine, of a squat, bushy stem, which bears small, round, black, and sweet berries, and has been observed nowhere else by me. Ginseng and both varieties of the snake-root occur in plenty and are industriously gathered. Of other medicinal plants there are found the *Collinsonia, Veronica virginica, Lobelia syphilitica, Aralia racemosa, Nudicaulis, Spiræa trifoliata, Actæa racemosa, Asclepias tuberosa, Aristolochia frutescens,* etc., and numberless others which I have cited elsewhere in a list of North American sanative remedies. What with our short stay at a season already advanced, the list of the remaining plants met with in this region would be too uncertain and insignificant to be given place here. We found only a few autumn plants in bloom, and those well known; but spring and summer in the mountains and swamps of this western country would certainly afford a rich harvest, not only of rare plants but of those unknown. Among other things these forests would supply many new contributions to the order of mushrooms, of which uncommonly large specimens are sometimes found. I saw a white *Lycoperdon,* which weighed two and a quarter pounds and was in diameter a foot and eight inches.

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* More circumstantial accounts in this regard are to be found in P Kalm's description of how sugar is made in North America from several sorts of trees. *Schwed. akad. Abhandl* XIII.

Fruit is still a rarity, here as well as throughout the mountains. Near to the Fort [Fort Pitt] was an orchard, planted by the English garrison, but since wholly neglected, and this was the only one for perhaps a hundred miles around. In it were several varieties of the best tasting pears and apples. The common reproach that America is unable to produce as good fruit as Europe will certainly not apply to this region. In the woods around there are many wild bees, and on still, warm evenings one notices quite plainly a pleasant smell of honey.

[I, 436-444.] Of the medical knowledge of the Indians the opinion here and there in America is still very high.* The greater number, but not the well-informed, are convinced that the Indians, mysteriously skilled in many excellent remedies, carefully and jealously conceal them from the white Europeans. As always so here, people are deceived by the fancy that behind a veil of mystery there lie hidden great and powerful things. I see no reason to expect anything extraordinary or important, and I am almost certain that with the passage of time nothing will be brought to light, if as is the case, outright specifics are looked for and presumably infallible remedies. I do not therefore deny in any way that we must thank the northern half of America for sundry medicaments of value, and I apprehend as well that every new remedy must be to the patriotic American physician a treasured contribution to his domestic medical store. Most of the diseases for the healing of which the skill of the Indians is especially praised are simple, those in which nature may work actively and effect the most salutary changes. The variety of diseases among the Indians is not great and is confined chiefly to fevers and superficial injuries. The observers and panegyrists of the so much belauded Indian methods of therapy are commonly ignorant people who find things and circumstances wonderful because they can not offer explanations from general principles. The bodily constitution of an Indian hardened from youth by vehement exercise and by many difficult feats, demands and bears stronger medical excitants; and endowed originally with more elasticity, the physical system of an Indian often rids itself of a malady more promptly than that of a European, weaker and softer, is able to do. Their weaklings succumb in early youth, and those who survive all the hardships of a careless bringing-up owe it to their better constitution. The medicines of which they make

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*This ungrounded but ancient misconception Dr. Benjamin Rush of Philadelphia some time ago undertook to combat. See his *Oration delivered February 4, 1774, before the American Philosophical Society, containing an enquiry into the natural history of Medicine among the Indians of North America.* A translation of this readable essay is to be found in *Samml. auserles. Abhandl. für Praktische Aertzte,* IV. 267.

use are few and simple, potent naturally or through the heaviness of the dose. A mild repeated purgative the Indian knows nothing of, and with him the effect must continue at least a day or maybe two days without stop. The most of their praised specifics are purgatives, perspiratives, or urine-stimulants, which they use not sparingly at the first approach of disease, and in this way often check the progress of the malady. But success does not always attend the treatment. Certainly, cases enough occur where the prescription is agreeable to the malady, and great benefit is suddenly experienced. Such instances are then noised abroad until the story of one and the same case becomes so varied and magnified that it is regarded as a daily and hourly occurrence, proof of the medical skill of the Indians, and so the craving after their mysteries is continually renewed and maintained. On the other hand, it is not remarked how many Indians fall unhappy sacrifices to their over-praised methods of cure. It is not observed that inflammatory fevers, small-pox, and other violent diseases ravage unspeakably among them, because their received methods can effect nothing in such cases, more than chance being necessary in the treatment. It is not observed how most of their chronic patients leave the world as a result of carelessness and unskilful handling. The Indian, when he falls ill, has recourse first to his roots and sacredly regarded herbs; he purges and sweats inordinately; fasts for days together; leaps into cold water, and submits to conjurings. Should he conquer his disease by rousing another—well and good, the medicines have done it. But should these first general means prove in vain, he knows not what to do further, uses promiscuously what strikes his fancy, and chance not being favorable to him, gives himself up to despair and his destiny. And what should lead us to think that a people as rude as the Indians, so heedless and without foresight, could be more fortunate in the discovery of specifics and more successful in applying them than nations which by their united efforts and assembled experiments have not yet learned how to work wonders? Or why are we to believe that the American soil is more beneficent than the rest of the earth in the bringing forth of specific means? The Indian lives truer to nature, if living wild and unconstrained may be so called. His way of life subjects him to a number of miseries; he suffers alternately the extremes of hunger and fullness, cold and heat, activity and relaxation, all which must work in his body powerful and mischievous changes. Is he exposed to fewer diseases merely because he has less knowledge and skill in the treatment of them? Civilized nations live softer and more meticulously, and bring upon themselves a greater number of maladies. But also are they not able to remove or alleviate a greater number of maladies, and to prolong the lives of weaklings, who elsewhere perish? But however true these things are, and however grounded the charge that the Indians jealously keep secret their specific and wonder-working remedies, the burden of accusation is in some measure lessened by their generous readiness to produce without reward their manifold roots, barks, and herbs for the behoof of those needing aid, even if they do not indicate whence they got them. They show at least no selfish and mercenary views, which are the commonest motives among the no less numerous mystery-usurers of more civilized and enlightened nations. A speaking example of this has been just now afforded in Pensylvania and adjacent parts by a certain Martin, who boasted of possessing an all-powerful but secret cure for cancer. This aroused the credulity and won the confidence of his people so much the more because of the clever pretext that the discovery of the root (according to him the medicine came from a root) had been communicated to him in confidence by an old Indian at Pittsburg. Although shrewd and impartial physicians at Philadelphia found good reasons to doubt the highly praised worth of the remedy in genuine cases of cancer, the incredible number of imaginary or pretended cases of the disease, news of which came in from all parts, was astonishing. Never before had so much been heard of this malady. But it was certain, that fear and prepossession caused the anxious patient to fancy every obstinate or rooted impostume must be cancerous, and it was to be expected of the purveyor of the famous remedy that he, for his advantage, should claim everything to be cancer, and thus multiply his cures. However, it was by no means clearly made out that the medicine used by him was in reality taken from nothing but a root. But he sought to spread abroad this belief, and almost every year made a journey to Pittsburg, pretending to dig his mysterious root there from a particular hill on the Monongahela. Since I had come from Philadelphia, the attempt was made to search out this root for me, and I was shown the region whence it was believed he got the root; I found there in great quantity the *Sanguinaria canadensis* (blood-root), and the *Ranunculus sceleratus L.* Both roots have corrosive properties, and from many other circumstances too numerous to mention, it is highly probably that Martin made use of one or the other, if only to conceal other and more powerful constituents mixed in, for it is supposed that he added arsenic to his medicine.* Both plants are very common in other parts of America, and the blood-root is here and there used as a remedy for warts and in cleansing slight sores. It is to be wished that the physicians in America, who have already in other matters shown their patriotism in many noble efforts, may also have a patriotic eye to the completer knowlege and more general use of their native materia medica. It betrays an unpardonable indifference to their fatherland to see them making use almost wholly of foreign medicines, with which in large measure they might easily dispense, if they were willing to give their attention to home-products, informing themselves more exactly of the properties and uses of the stock of domestic medicines already known. They would then have the pleasure of showing their fellow-citizens how unreasonable it is to envy the poor Indians their reputed science, and they would be working usefully for the community and beneficently for the poor if they made it their business to further the employment of the manifold wealth afforded by nature in its precious gifts to them.

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*After Martin's death, in 1784, Dr. Rush discovered and published in the second volume of the *Transact. of the Amer. Philos. Society*, that his cancer-powder consisted of white arsenic and a plant ingredient.

[I, 466.] We were introduced to still another domestic tea-plant, a variety of Solidago.* The leaves were gathered and dried over a slow fire. It was said that around Fort Littleton many 100 pounds of this Bohea-tea, as they call it, had been made as long as the Chinese was scarcer. Our hostess praised its good taste, but this was not conspicuous in what she brewed.

[II, 19-20.] The most important thing for me at Lancaster was the very agreeable acquaintance which I had the pleasure of making with the pastor of the Lutheran congregation there (and now Principal of the new college), Mr. **Heinrich Mühlenberg.** This excellent man, through his own diligence, has gained a very considerable knowledge of natural history and is unwearied in the study of the animals, plants, and minerals of his region. I have reason to regret that I came to know him so late and only for a brief space; his acquaintance would have been the more valuable to me, and his memory will be all the more cherished by me, since among native-born Americans he was the only amateur of natural science I got to know and could question on that subject. If among his countrymen there were many of his exemplary diligence and zeal after knowledge, America would soon know better its own productions, and natural history would be greatly enriched.

[I, 205.] Mr. Ettwein and Mr. Hübner are at present the ministers [Bethlehem]. The first was absent, but in Mr. Hübner I found an agreeable and amiable man, and a lover of botany, for which his profession allows him no time. The health of the community is cared for by Mr. Otto, at once physician, surgeon, and apothecary.

[I, 216.] For sundry observations on the medical properties of certain indigenous plants I must thank the experienced Mr. Otto. It is not generally known that the European juniper-tree grows easily from twigs stuck in the earth, after the manner of most cuttings from leaf-trees. In Mr. Otto's garden are several shrubs grown from the planted twig.

[I, 281-282.] We collected in this region [Wyoming] several varieties of mature seeds; but I must confess that considering the place and the season we found little that was new. Rattlesnake-root [*Polygala Senega*] grows here in quantity; also *Chenopodium anthelmin-*

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*SOLIDAGO *suaveolens;* foliis lanceolato linearibus, integerrimis, acutis, subquinquenerviis, punctatis, glabris, tenerrime ciliatis—Virga aurea Americana, tarraconis facie & sapore, panicula speciosissima *Pluk. alm.* p. 389, tab. 116, f. 6—A species similar to this grows about New York, and has a pleasant odor of anise, noticeable also in the plant here, but weaker; no doubt because it was already late in the season and it had suffered from the cold.

thicum; and *Cleome dodecandra,* which is praised as a vermifuge. A new species of the *Parnassia,* which I discovered about New York, grows here plentifully in swampy meadows. Among trees there was conspicuous a group of beautiful larches, called Tamarac; they use here a drink made from the bark, for swollen feet after fevers.

Maryland.

[I, 484-494.] Dr. Fisher at Fredericktown (also Apothecary and at the same time Sheriff) told the following remarkable story, and all those present confirmed it. A farmer, Jacob Sim, living eight miles from the town, was eleven years ago in the month of July bitten by a rattlesnake. Every year since, in the same month of July, he has fallen ill and feverish, the skin over his whole body becoming spotted blue and yellow. Carver observed something like this, and mentions that it happens commonly that after the bite of a rattlesnake not only the wounded part grows swollen, but the swelling extends gradually over the whole body, and makes it of as variegated a color as the snake; and further he speaks, as if certain, of an annual **return of the symptoms shown in the first instance.*** Everywhere I informed myself of the rattlesnake and the copper-belly (also called moccasin-snake), the bite of which is quite as poisonous. The different accounts given by the country people are of one accord, that these noxious beasts are much less numerous than they once were.

The general symptoms which follow the bite have been described at length by Carver and by others before him.† The shivering which immediately follows the wound may well be the effect of fright. Were the circumstances not so various, the efficacy of the poison, the activity of the wounded body, the conditions of the wound itself, and the season of the year, it could not be easily explained why so many are bitten without the least ill consequences, others recover after more or less significant symptoms, and others (but rarely) succumb on the spot. Dr. Garden saw a negro bitten in Carolina fall dead after fifteen minutes. And without such a diversity of circumstances it would be impossible to make anything of the great number of remedies, of all descriptions and often apparently trifling, which by one and another are recommended as most excellent for the snake-bite. It will not be superfluous to set down here the sundry remedies for the snake-bite which in different parts of the country were pointed out to me and praised.

They are as follows: *Collinsonia canadensis* (Horse-weed), *Cunila mariana* (Penny-royal), *Cynoglossum virginicum, Hydrophyllum*

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* Carver's *Travels,* English edit. p. 449. 450.

† Descriptions of the snake, of the symptoms and remedies, are to be found in Kalm's account of the rattle-snake, *Schwed. akad. abh.* XIV, XV; in Linnaeus, *Amoenitates acad.* Vol. II, Diss. XXII. *Radix. Senega;* and elsewhere.

canadense, Convolvulus purpureus (Purple Bindweed),* *Gentianae species* (Sweet Bazil), *Eryngium aquaticum, Sanicula canadensis* (Blacksnake-root), *Ribes nigrum, Hypoxis erecta.*† *Uvularia perfoliata, Pyrola maculata* (Pipsissiwa), *Phytolacca decandra* (Cancer-root), *Asarum canadense & virginicum* (coltsfoot), *Spiraea trifoliata* (Ipecac), *Actaea racemosa* (Blacksnake-root), *Sanguinaria canadensis* (Blood-root), *Thalictri species, Ranunculus repens & alii, Scrophularia marilandica, Polygala Senega* (Virginia Snake-root), *Hieracium venosum, Prenanthes alba* (Dr. Witt's Snake-root), *Serratura spicata & squarrosa, Solidago canadensis, Erigeri species* (Roberts' Plantain), *Aristolachia Serpentaria* (Rattlesnake-root), *Quercus nigra* (Black oak), *Iuglans alba & nigra* (Black and white walnut), *Acer Negundo* (White ash)‡, *Veratrum luteum* (Rattlesnake-root), *Osmunda virginiana, Adiantum pedantum, Hypnum castrense.* Of these divers plants the roots mostly are pounded or ground and ordered to be laid on the wound; but of some, the leaves and bark also. Merely the inner bark of the white oak is laid on the previously scarified salt-rubbed wound. Of the black and white walnut the inner bark is to be beaten and the fibre twisted into a cord and this bound about the wounded limb above the bite. The bark of the white ash is burnt, the ashes made into a paste with vinegar and applied to the wound, and at the same time a decoction of the bark and the buds is to be drank. But among all the above-listed plants the Aristolochia serpentaria and Polygala Senega have especially held the general esteem; and to these must be added the Roberts' Plantain, which has been praised by several, particularly the worthy Dr. Otto at Bethlehem, from positive and often confirmed experience, having many times been of excellent use where signs of the poison taken up into the blood were already plainly manifest. This plant, little known as yet, grows well in hilly regions and is found in plenty about Bethlehem; it is raised there foresightedly in gardens, so as to be found in the night if occasion arises. Its leaves have a bitter, sharp, biting taste. They are applied, freshly crushed, to the wound and often renewed, and also a decoction made of them is copiously administered.

Another tried remedy was made known many years ago by Caesar, a Carolina negro, who was rewarded by the State of North Carolina with his freedom and a considerable sum of money. Having been many times tried, the especial efficacy of this remedy seemed to be admitted. It consists of the roots of the Hoarhound (*Marrubium album?*) and Plantain (*Plantago major vel lanceolata?*). These roots are mixed in equal parts, and three ounces of the mixture boiled in two quarts of water until reduced by half; the patient takes a third of this decoction three mornings together on an empty stomach. It reduces the symptoms and if continued effects a complete cure. If the fresh roots and simples are at hand they are pounded and expressed and a large spoonful of the juice given daily. Two spoonfuls are said to be sufficient for a cure. The herbs and roots, after expressing or boiling, are laid upon the wound, or as a substitute a leaf of tobacco steeped in rum. Both of these plants are of European origin, and grow in America as aliens, only in the settled parts and not in the wilds. How the negro got a knowledge of them is not certain; perhaps through some European—for both plants have been of old praised and used in the treatment of wounds, and, besides, one of them, the Hoarhound (*Marrub.*) has been greatly commended for the bite of noxious animals and mad-dogs.

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* With the juice of this plant, according to Catesly, an Indian, having smeared his hands, took hold of a rattle-snake and fingered it without fear or injury.

† Aletris farinosa (Star-root).

‡ Panax quinquefolium (Ginseng).

Among all the remedies used exteriorly the most effective and reasonable are: the application of a ligature immediately above the wound; the sprinkling on of salt and pepper, gunpowder or tobacco; timely and repeated cupping; the searing of the wound, on the spot or as soon as ever it can be done: these remedies are now and again used with good results by the country people or by surgeons. And the fat of the rattlesnake is at times rubbed over the wound, but from this very little indeed should be expected.

[I, 545-547.] Several plants are grown here which farther to the north are scarcely seen. Cotton-wool (*Gossypium herbaceum*) and sweet potatoes (*Convolvulus Battatas*) are raised by each family sufficiently for its needs. The blacks raise 'Been-nuts' (*Arachis hypogaea*);[*] this is a pretty hardy growth, which at all events stands a few cold nights without hurt. The thin shells of the nuts, or more properly the husks, are broken, and the kernels planted towards the end of April in good, light soil, perhaps a span apart. They must then be diligently weeded, and when they begin to make a growth of stems, all the filaments or joints are covered with earth. After the blooming time the pistils and young seed-cases bury themselves in the ground and mature under the earth which is continually heaped upon them. The kernels have an oily taste, and roasted are like cacao. With this view the culture of them for general use has been long recommended in the Philosophical Transactions, and the advantages of making this domestic oil plainly enough pointed out, but without the desired result.

Virginia.

[II, 114-120.] The James River tobacco is reckoned the best sort which Virginia produces, and keeps its price pretty well unchanged at 6 Span. dollars the hundred. For smoking one finds the coarse leaves of this tobacco vastly stronger and pleasanter than those of northern Virginia and Maryland, which are milder and lighter on the tongue. In Maryland the plants are let grow until they have 8-10-12 or more leaves before they are topp'd, that is, the tops are broken off so as to check the upward growth; but in this region the rule is to let the plants come to but 6, or at most 8 leaves, and it is thought that better tobacco is thus obtained. Here they raise much "Sweetscented Tobacco," which requires a good, light soil, and from its stronger quality should make particularly good snuff-tobacco. "Long-green Tobacco" has great, fat, long leaves, and does best on a strong soil. "Kitefoot" is an agreeable, lighter sort, and thrives on light, sandy soils. "Varinas" gets its name from Varina, the splendid estate of a Mr. Randolph on James River. It is said that the tobacco raised about Little Frederick, and called "Frederick," makes exceptionally good canaster. Other varieties of this plant are the Oronooko, Hudson, Thickjoint, Thickset, Shoestring, and many more, grown on divers kinds of soil, requiring different treatment, and only the planters themselves being able to distinguish between them.

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[*] This plant, with a few others of the same class, has the rare property of burying its seed-pods in the earth. The bloom appears far down on the stem, and inclines towards the earth, in which the pistil buries itself and matures round husks with 2—3 seeds, which are dug out for use. . . . It is believed to be originally an African plant which was brought to the American colonies, particularly the sugar colonies, by the negro slaves; the blacks are very fond of them and plant them industriously in the West Indies, in the little patches of land left for their use. . . . In some parts they are called also "ground-nuts" and "ground-peas."

Cotton (*Gossypium herbaceum*) is raised here and there, even in Maryland, but is far oftener seen in this more southern region. As yet none is exported, the people themselves using all they produce. This is an annual plant, and requires either good new land or land well dunged. The seed planted not all coming up, six or eight grains, towards the first of May, or earlier (when night-frosts are supposed to be past), are placed in little hills thrown up three to four feet apart. When these come up, the weaker plants are pulled out, so as to give the few remaining more nourishment. After the plant has reached a height of a foot or a foot and a half, earth must be newly heaped up about it, and all foul growth weeded out; and continuing to grow until there are four or five side-branches, the plants are broken off at the top, and when these side-branches have each put out four or five buds, the ends of the branches themselves are broken off, so as not to let them grow into long, barren stems; but in this item there is not everywhere (especially in Carolina) the same sort of careful attention. Moreover, the suckers, or young side-sprouts, must be nipped off. All this done the plants are let bloom, mature, and stand in the field until there is opportunity to take them in, which is often not until late in October. The blooms stand only two days, white on the first, yellow on the second, and then falling, after which comes a pod-fruit of the size of a walnut, and this finally opens. They have two varieties of this plant, one with a rough, and the other with a smooth seed, but there is no marked difference between the plants. Many people select carefully the smooth seed, and plant nothing else, the wool from it admitting of easier separation, by means of a hand-mill, between two wooden cylinders moving lightly the one over the other. Ants often damage the seed in the ground; and to keep them off, the seeds are mixed with ashes, luke-warm water poured over, and let stand overnight; in this way the seed swell a little, and the ants, it is said, do not then attack them. The statement is made that even boiling-hot water does not greatly injure the sprouting faculty of these seeds, most of them coming up afterwards. Four pounds of raw seed give about one pound of wool. The wool, with the seed in, was formerly sold here and in North Carolina at 4-6-8 pence the pound.

Cushaws, a sort of gourds, are raised in Virginia in greater quantity and more generally than farther to the north; they have them black, yellow, and white, and use them for pot herbs. Perhaps in no other country are all kinds of gourds and melons so much used as in America; in the summer and autumn one can not see without amazement the great quantities of water and other melons brought to market at New York and Philadelphia, as well as eaten in the country or let lie in the fields. The plant recommends itself because, under the warm sun it does well without much attention or care. For whatever needs more than a little work without producing a great profit is not to the American taste. And so the pleasure of a fine garden is as yet scarcely known in Virginia. Perhaps a few of the most considerable families have made attempts, but commonly the people are satisfied with planting cabbage and turnips in an enclosed space, which goes by the name of a garden, and sticking among them a few uncomely flowers. The Virginians are so much the more at fault for neglecting a matter which might add to the enjoyment of a residence in the country and embellish their places, because their mild winters and warm summers must certainly give them many advantages. In the spring they have pease, beans, and other vegetables by the end of April, or at least early in May, 6 weeks or two months earlier than in New York. With the passage of time they will indeed learn to make a better use of the advantages of their country than is the case among them at present. Bignonias appear here as large, strong trees. The Melia Azedarach (Bead-tree) is frequently planted before the doors of houses, and this originally East Indian tree stands the winters right well. In sundry gardens there are tea-shrubs*, which succeed very well, and multiply easily. Besides, the Hibiscus Syriacus, the Babylonian willow, the box-tree, the myrtle, and one or two other plants, I was able at this season of the year to recognize by way of foreign growths which it had been attempted to domesticate. And nevertheless in the Virginia climate many useful and pleasant plants might be made to do extremely well; the domestic chestnut, the round-leaved ash, the European wallnut tree, the laurel-cherry tree, the pomegranate, the bay tree, and many others, would find a congenial home here.

Of indigenous plants not one was to be seen in bloom; evergreens excepted, everything was leafless and hibernate; and yet we were not below the 37th degree of latitude, and thus 4 degrees to the south of Rome, round about which, even at this time of the year, one can pluck many sorts of flowers.

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* Later information gives assurance that in several parts of the United States the culture of the tea-shrub has been gone about assiduously and with good hopes of success; chiefly for the following reasons: China, like the American states, has a surface extended to the west and northwest; and lies toward the Southern Ocean precisely as the United States towards the Atlantic; these two countries are in the same latitude, and in both (and nowhere else) is the ginseng indigenous, and this last circumstance especially argues so great a similarity of soil and climate as to permit the hope that the tea-shrub will very likely thrive under American skies, at least the experiment should be a tempting one. And it should not be forgotten that sugar-cane, the basis of the whole West India trade, was originally also a stranger from the East.

North Carolina.

[II, 176-177.] At Edenton we were for the first time regaled with the domestic tea universally known and beloved in North Carolina. This is made from the leaves of the Ilex cassine L., a tolerably high and beautiful tree or shrub, which growing abundantly in this sandy country is very ornamental with its evergreen leaves and red berries; more to the north and even farther inland it is rarer. It is here generally called **Japan,** but has this name in common with the South Sea tea-tree (Cassine peragua L.), which likewise grows on the Carolina coast, and is also generally esteemed for tea. The people here have a very high opinion of the good qualities of the Japan; they not only make use of it for breakfast instead of the common Bohea, but in almost every kind of sickness as well. Near to the coast, where the drinking water is not altogether pure, it is pretty generally the custom to boil the water with these leaves. Such an infusion is not unpleasant, if it is properly managed. There are those who in a slovenly manner chop up the fresh leaves, the twigs, the wood, and the bark all together; but this gives the water a repulsive taste. More careful housekeepers have the leaves, which may be gathered at any season of the year, culled out in a cleanly way, and dried in an iron kettle over a slow fire; they then pound them a little in a mortar, so as to keep them the better in glass bottles, but before putting them up they let them evaporate a while in the air. Prepared thus the taste betters by keeping, and not seldom a pound fetches one to one and a half Spanish dollars.

[II, 189-199.] We landed on the south side of Albemarle Sound, at the mouth of a small river, on the banks of which were assembled almost all of the different and beautiful ever-green plants which before we had met with only here and there, and dispersed. The sight of such a splendid green coppice in the depth of winter (it was the 31st of December), could not fail to be pleasing. These ever-greens are oftener to be found along the coast where the weather on the whole is milder than farther inland. The most conspicuous of those we found together were: Ilex Aquifolium (Holly). Ilex Cassine (Carolinian Holly or Japan). Prinos glaber (Winterberry).—Myrica cerifera (Candleberry-Myrtle).—Laurus Borbonia (Bay-tree). Bignonia sempervirens? (Yellow Jasmine). Smilax laurifolia—and other varieties of this species, which however do not hold their leaves so well as this. Prunus lusitanica (Evergreen-Baytree). Kalmia latifolia & angustifolia—and divers Andromedae, which keep their leaves longer here than in the northern regions. Hopea tinctoria—used for dyeing yellow; the leaves are boiled half an hour, and the stuff soaked a quarter of an hour in the poured-off infusion, while hot; the color comes a fine straw-yellow; cotton takes it better than linen.—Juniperus virginiana (Red Cedar)—Cupressus thyoides (White Cedar), which often grows trunks 60-100 feet long, and 12-15 feet in circumference at the butt. But they reach this extraordinary height only in fat swamp-land, and where they are protected by other trees against violent winds which their shallow roots do not easily withstand.—Pinus Taeda, and other varieties of the species.

But besides these shrubs and trees, commending themselves to the eye by their enduring leaf, there are many others both useful and beautiful.—Cupressus disticha (Bald Cypress) is plentiful in these swamps. Its seeds fall at this time of the year; each scale of the seed-vessel has at the stud a little blister of fragrant, clear resin, of which no use is made. The wood is light and durable, and hence makes the best shingles and boards.—Callicarpa Americana (Sourbush) was still hanging full of its pale purple berries, which give a bright purple color to cotton stuffs.—A splendid tree, very useful in ship-building, is the **Evergreen oak,** Quercus Phellos sempervirens; Marshall, Amer. Grove—which begins to appear in this region, and grows continually more abundant towards the south. It is found also in the western country, on the Ohio and the Mississippi.—Other common trees, seen here and everywhere, I need not mention.—But the Melia Azedarach, the Bead or Paternoster tree, deserves notice. It is not indigenous, but thrives prodigiously and belongs among the rapid growing trees. They showed us one at Edenton, five years old and raised from the seed, which measured 9 inches in diameter, and had made a shoot or sprig 11 feet long, one year's growth. . . .

It is an advantage that now at midwinter one has almost the same prospect as that to be had in summer. That is to say, the sparse, thin grass which grows under the pines and on the dry sand turns as wilted and brown from the heat as it is now yellow and sapless from the cool winter nights. Everywhere the *Stipa avenacea L.* appeared to have the upper hand here; a rough grass which is eaten by cattle only in the spring when it is quite tender. On the dryer tracts there is absolutely no undergrowth or bush among the lofty pines and the trees standing by no means close, one can see far between them. But at every brook, or at any rather moister spot, there appear forthwith beautiful thickets of evergreen bush, called indiscriminately **laurels,** and such places consequently are known as laurel-swamps.

The *Yucca filamentosa L.* was now often to be seen in the woods. Its leaves can be cut into threads, thin and strong, of which the people make use for various household purposes.

[II, 216-226.] The *Iris verna L.*, called Violet here, the *Viola* *pedata* and *palmata, Gomphrena flava, Lupinus perennis, Sanguinaria canadensis, Sarracenia lutea* and *purpurea. Cypripedium Calceolus, Azalea viscosa, Kalmia latifolia, angusifolia,* and *glauca,* and other plants seem, from the partial accounts I had, to belong among the first to appear in the spring, blooming towards the end of February or the beginning of March. The remarkable *Dionaea Muscipula L.* (Flytrap) is at home in this region, but seems to be known to very few of the inhabitants. And besides it, there are many rare plants to reward the future investigator. . . .

In North and South Carolina, besides corn, a small kind of peas, called Indian peas, is very much raised. They yield heavily and in good years produce 40-50 for one. They plant them the end of April or the first of May and gather in October.—The people here distill a bad sort of brandy from potatoes (*Convolvulus Battatas L.*). . . .

That the greatest and most important part of the immense forests of this fore-country consist of pine, I have already several times mentioned. But it is precisely this wood which so much advantages the inhabitants, in which lies the compensation for their generally sterile soil; it is this that supplies them with excellent timber for building and other purposes, and with the opportunity for considerable gain from turpentine, tar, pitch, resin, and turpentine-oil. Therefore the pitch-pine is for North Carolina the tree most important and profitable. . . .

The **Pitch-pine,** here so-called, which is greatly preferred for turpentine because most resinous, has three very long needles in each case; the tree is of a tall, comely growth, and has long, bare boughs upward bent, which, commonly at the extreme end, bear out-standing tufts of needles. It appears more like *Pinus Palustris Mill.** than *Pinus Taeda L.,* since it grows here almost on barren, sandy soils, and is found oftener towards the coast than farther inland. This tree is not apparently weakened if turpentine is drawn from it many years together, and it is even thought that it merely grows the richer for these tappings, and used finally as light-wood yields the more in tar and pitch.

Together with it, but in greater plenty farther inland, grows the **Rosemary-Pine**† so-called, which has but two needles, and short ones, and yields vastly less turpentine than the other, nor for so long a period. The name **Yellow-Pine** is given in this country for the most part to the rosemary pine; but others hold that this is a particular variety of the pitch-pine, distinguished by a thinner, smoother bark, a softer, yellower wood, somewhat shorter needles, a straighter and less branching growth, and that the variety may be discerned quite young and makes a better house timber. Others again give the name yellow-pine only to very old pitch-pines, and believe that the tree makes no good timber until then.—It is difficult to get a clear notion of the many names, varieties, and sub-varieties of this region.

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* *Pinus palustris* foliis ternis longissimis, Von Wangenheim's *Beyträge,* 73. Marshall's *Amer. Grove,* 100. The former says, it seems to contain little of resinous parts; the latter, that it is as resinous as any other kind.

† Pinus virginiana; Jersey-Pine; two leaved Pitch-pine—von Wangenheim's *Beyträge,* 74; Marshall's *Amer. Gr.,* 102.

South Carolina.

[II, 247-252.] The lands of our host, being dryer and sandier, were not suitable for the culture of rice; therefore he occupies himself chiefly with **Indigo.**

They have sundry varieties of indigo; but in this flat, sandy region that which is best and most profitable is called, to distinguish it from the other sorts, "false Guatimala" or "true Bahama." It does well on soil of a moderate fertility, but if circumstances allow, new land is used or that previously dunged. A few prepare the land for indigo by green manuring, that is, they put on very thin seedings of oats or wheat, and when nearly ripe turn in horses and cattle to eat it off and firm it together.

The seed is planted after the first rainy weather in March or April, in rows 1½-2 ft. apart, the plant growing almost that high. When towards the beginning of July the lowermost leaves grow yellow and begin to fall, and the blooms commence opening, the plant is regarded as ripe for cutting, which is done a second time about the end of August, and if it is a warm fall a third cutting may be had towards the end of September. In order that the work of cutting may be done forehandedly, and not hurried on account of the quantity to be handled at any one time, fields are sown so as to come in at distinct intervals. The plant should not grow over-ripe. Indigo-fields require much attention, and must be diligently kept clean of caterpillars and weeds. Some 20 negroes are necessary to look after a plantation of 50 acres of indigo land and prepare the indigo, over and above what must be done in raising what they themselves and the planter's household need.

After rice, indigo is the chief staple of Carolina, and the yearly production and export reaches several hundred thousand pounds' weight. Its cultivation may and will increase, since there is no lack of suitable land, nor is any great capital necessary for a first beginning. At Charleston a pound at this time brings 3-5-7 shillings sterling; but neither in quality nor in price is the South Carolina indigo equal to that from the Mississippi, the West Indies, or South America. Besides that mentioned as most usually raised, the "false Guatimala," there is cultivated here and there in Carolina the **French or Hispaniola Indigo,** which however does not do so well, because more susceptible to cold, and on account of its deep roots demanding a fatter and richer soil. A third sort is called **Wild Indigo** (*Amorpha fruticosa L.*) ; an indigenous growth, regarding the quality of which opinion is not yet settled, but from its easier cultivation and greater productivity this should be preferable to both the others.

[II, 270-287.] During these cold days of January and February, in the neighborhood of Charleston not an indigenous plant was to be seen in bloom; for in this climate spring does not really come before the middle of March or the beginning of April. But in sundry gardens the following European plants might be found greening and blooming:—

Alsine media—Lamium amplexicaule,—Leontodon Taraxacum,—Rumex crispus & acetosa,—Poa annua,—Vitica dioica, and *Sonchus arvensis.* Of garden flowers there were blooming at this time narcissuses and jonquils. Also the orange-trees, which are everywhere in the houses and in the open in gardens, seemed to be standing the severe weather pretty well; they were full of fruit and burgeons. But often they are frozen, and this is not seldom the case even to the south, at Pensacola in Florida. There it has been found at last by experience that the best means of guarding these trees against the injurious effect of great winter cold or northwest weather, is to take away the earth from their roots at the approach of winter, exposing the whole tree so that all its parts may be subject to the same temperature. Not one tree died that was handled thus; but those from which the earth had not been removed from the roots cracked and died. A palm tree, 7-8 feet high, standing out in a garden, suffered from this weather, and its leaves hung slack. Several other trees from warmer regions, such as *Croton sebiferum, Sapindus saponaria;* etc., which hitherto had withstood the cold well in the open, it was found would this time hardly escape damage. These and other tender plants which Carolina has in common with the West Indies, either naturally or from transplantation, thrive only on the sea-coast where, in comparison with the inland country, milder and more temperate weather prevails generally. . . .

Pleasant regions or diverting changes of prospect are not to be found about Charleston; the whole landscape is flat and sandy; tracts next the sea and the rivers are swampy. The greater part of the fore-country is taken up in pine-forest. Of these pines the following four varieties are the commonest.

1. The **Pitch-pine.*** It has 3 needles in each sheath, always assembled tuft-wise at the extreme end of the branch, the rest of the twig being bare if the tree is mature. Young trees, two and three years old, have needles 12-15 inches long, which stand upright at the top of the trunk and give it a peculiar and splendid appearance. If the trees are older the needles are from 7-9 inches long, and each needle shows 3 sharp, slightly dented edges; the outer side is rounded,

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* Pinus palustris. Mill. Düroi, P't II, No. 8. v. Wangenheim, Beyträge, 73.

the two inner sides are flat, so that the 3 needles fit exactly together and form a long, thin cylinder; they are, for the rest, straight or only a little twist, the same breadth throughout, and but a little pointed at the end. The young trees grow no side-branches until they are 4-5 years old and 5-6 feet high, retaining until then their long, beautiful, upstanding tuft. The cones of this variety are 6-8 inches long and glisten with the plentiful resin they sweat out. Each scale has a rather wide eye, with a small, sharp point in the middle. The trunks grow tall and strong and their bark is smooth.

2. The **Loblolly-pine.*** It has likewise 3 needles in each sheath, and similar to those of the first, except that each needle is somewhat twisted. In young saplings the length of the needles is not more than 5-8 inches; in mature trees, not more than 4-6; but they are not, as with the pitch-pine, found only at the ends of the twigs, clothing them as a rule entirely. Also the branches stand up more and are shorter, whereas with the foregoing variety the half-naked boughs spread more out, and hang somewhat. Their cones are like the former, but shorter. The bark of the trunk is rough.

3. The **Bird's-nest pine.**—This name has been given it because all along the trunk a number of small, round, bushy sprouts break through the bark, and give the tree a strange, and at the first glance, distinguishing appearance. It is further peculiar for growing a great number of small twigs on the south side, and none or very few on the north side. There are two needles in each sheath, not more than 2-4 inches long, half-cylindrical, pointed, and slightly dented along the edges. The cones are oval, seldom more than 2 inches long, and each scale set with a small spine. The bark is very rough and broken.

4. The **Smooth-barked pine.**—It has 2 needles in each sheath, from 3-5 inches long, of a structure like the preceding. Their cones are also very small, and commonly quite smooth, but are to be distinguished by the very pleasant odor which is peculiar to them. The bark of the lower trunk is somewhat rough, but higher up grows smooth and white, retaining this characteristic and color, by which the tree may be known, throughout all the limbs, an appearance so unusual, especially in the younger trees and branches, that judging by it alone one would hardly suppose this to be a variety of pine.

These are the varieties of pine observed by me near about Charleston, to be easily and plainly recognized in loco by the descriptions given. But a special treatise would be necessary clearly and certainly to disintricate the sundry species and varieties of North American pines and firs, they, as it seems, being much affected by climatic and local conditions, and great confusion arising from the arbitrary, indeterminate names given them. Properly to rectify such confusions would require time and an observation of the trees in all situations and circumstances.

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* **Pinus Tæda.** Linn. v. Wangenheim, *Beytr.*, 41.

In Carolina there are found almost all the varieties of oak which appear elsewhere in North America; but about Charleston and on the near-by islands the following are chiefly seen:

The Willow-leaved Oak, Quercus Phellos Linn., the swamp-oak with the willow-leaf. Catesb. I, 16.

It grows to be a strong and comely tree. It is not so common in South Carolina as in North Carolina; it is also found in the more northern provinces, but not beyond Pensylvania, where, however, it is smaller and holds its leaves only in mild winters, whereas here the leaves are kept as a rule the winter through, although some of them fall.

The Live-Oak. Quercus virginiana Mill. Quercus Phellos. β. foliis oblongatis non sinuatis, L.—Cat. I, 17.

This splendid oak grows strong, tall, and handsome. There is a certain difference as between the leaves of young or old trees and limbs, which often gives them the appearance of distinct varieties. The leaves of the young trees, and of the young limbs of older trees, are lance-shaped or oblong, and are set with little points at the edge. The other leaves are similar to these in shape, but blunted, the upper surface somewhat wrinkled, the under, downy or white, quite curled at the edges. The Catesbean figure is therefore not precisely exact, showing these leaves smooth, as it does, when they are not. This difference as between the leaves borne in mind, it will be found that the Linnean character of the Quercus Ilex will also apply at times to the young trees of this species of oak. In addition there are sundry other varieties; sub-varieties appear with leaves exactly similar as to shape, but smooth and shining on the surface, and beneath merely silver-colored, without the least down. The leaves are invariably strong and thick, and throughout the year keep green and vigorous. This oak is not only an ornament in the forest but furnishes the most excellent and suitable ship-timber. A ship built of it, and hence called the "Live-Oak," was 40 years and more at sea, and was several times new-planked. This oak is to be found most abundantly in Georgia, but there as well as in the Carolinas only on the sea-coast or not far from it; it grows 40-50 feet tall.

The Highland Willow Oak. Quercus Phellos humilis. γ. L., Catesb. I, 22.

This grows in dry places and is not rare here; but attains only a moderate size. The leaves are lance-shaped, but shorter than those of the first willow-oak, and are smooth on both surfaces; the leaves have several incuts and points.

The Water-Oak. Quercus uliginosa Wangenheim. Quercus folio non ferrato, in summitate quasi triangulo. Cat. I, 20.

This oak is pretty common in the southern provinces, as often to be met with as any other. It grows preferably indeed in low, moist, and good soil, but not exclusively, being found also in dry places. The leaves approach in shape those of the common black oak, but are smaller, of a thicker structure, and keep green pretty well throughout the winter.

The other oaks found hereabouts are: The common black oak, the red oak, the red water-oak, the white, and the chestnut oak. Somewhat farther inland there is the low or dwarf oak, mentioned already more than once; but of all these none remains green over winter.

Besides the pines and oaks here remarked, the woods and open fields about Charleston are pranked with many other fine evergreen plants, which with temperate winter-weather keep up in some measure the charm of a perennial spring. I have remarked the following:

Ilex aquifolium, Ilex Dahoon, and Ilex Cassine L. All these sorts hold their leaves a lively green.

Olea Americana L. Ligustrum lauri folio, etc. Catesby I, 61. The leaves remain a bright green; as also

Prinos glaber L. Cassini vera floridanorum, etc. Catesb. II, 57.

Laurus indica and Borbonia L. Both, but especially the latter, keep very beautiful, their trunks pretty high and 2-3 feet through.

Kalmia latifolia, angustifolia, and prostrata L. The first of these lasts the best.

Lonicera sempervirens L. does not remain entirely green.

Smilax laurifolia and tamnoides L. lose a few of their leaves, but keep most of them and of a good appearance.

Bignonia sempervirens. Jasminum luteum, Catesb. I, 53, and another species, foliis conjugatis, continue very beautiful if protected in the woods, but otherwise not so well.

Magnolia grandiflora, tripelata, and glauca L. Both the latter continue only partly leaved, according to the nature of the winter; but the first is literally evergreen, and belongs among the trees of the first rank in this region, as well for its considerable growth (trunks 40-50 feet high, and more than 2 feet thick), as for its magnificent, fragrant blooms, and its continually green appearance.

Gordonia Lasianthus. Alcea floridana, Catesb. I, 44, here called Gardenia commonly—holds excellently well.

Hopea tinctoria. Arbor lauri folio. Cat. I, 54. Keeps its leaves green, but somewhat hanging, and shifts them only at the blooming season. The black cattle in the woods browse most on the leaves and young twigs of this and the Olea americana, although both, and especially the latter, have a bitterish taste.

Pyrola maculata, Mitchella repens, Vinca lutea?, Cassine Peragua, Rhododendron maximum, Andromeda mariana, and Myrica cerifera, all keep very beautiful.

Cactus opuntia shrivels a little; but Yucca gloriosa, Yucca filamentosa, and Agave virginica continue full of sap.

Orange-trees, planted in the gardens and in the houses, are not originally indigenous, but they hold their leaves, although not very fresh. Twenty to thirty miles from the coast they let fall the most or all of their leaves in the winter as is the case with the lemon-tree even here. Orange-trees left to themselves and gone half-wild, arm themselves with long thorns, and are used here and there as hedges.

Among the evergreen plants here, belong also the Cabbage-palm (Areca oleracea L.) and the small dwarf-palm (Corypha minor L.?) both of which occur only along the coast.

Besides the plants noticed here, there are to be seen many others which keep their leaves a part of the winter, but more or less discolored or changed, and therefore not to be counted among those mentioned. With so fine a store of lasting plants, it will be very easy to have the pleasure of a continual green in the gardens, and to make famous winter-gardens. Many of the European annual plants keep green and in bloom throughout the winter, but in the heat of summer die away, at which time the indigenous annuals begin to shoot, and last through the hot season into September. But gardening is not very much in vogue and is generally left to ignorant negroes. Nor is it very long since all cabbages, pot-herbs, cauliflowers, and other garden-vegetables, were brought from the Bermuda islands to the Charleston market. A skilful English gardener, Mr. Squibb, had first to show the inhabitants that they could abundantly supply themselves if they would only make the necessary changes in the culture of vegetables, which the nature of the climate demanded. For these do not thrive so well throughout the summer as in the spring and the fall, and are to be kept in the open the winter through, green and growing. Root-plants, as radishes and yellow and white turnips, hold their own and grow even during the summer, but far less well than in the spring and the fall.

Of fruit-trees they have pears, apples, peaches, plums, and cherries. Apples and peaches, which are not particularly good, are ripe in June. These and other transplanted fruits mature so rapidly that they have not, it may be for that reason, so good a taste as in the northern country. Most of these fruits bloom twice a year; but seldom ripen the second time. The fig-tree bears 3 and 4 times, in May and June, September and October. There are a few European olive-trees, which do well and yield heavily, but they have not yet learned how to conserve the fruit properly.

Wheat is sown in September and cut in June. Corn is planted in April and harvested in August.

Although the soil about Charleston, mainly a shell-sand, promises little fertility, there is no lack of remarkable instances showing the rapid progress of vegetation in the same. Warmth and moisture do what the thin soil of itself could not. In a garden outside the city there are pointed out many lemon trees, which at the siege of 1780 were cut down to the ground, and yet by February, 1784, had shot up twelve feet high and 3-4 inches thick. A Tallow-tree (Croton sebiferum L.) which had met the same fate, has grown since to 15 feet and more. The China-root, or Smilax China, here in one year runs out 40-50 feet, winding about the trunks and branches of trees. Often in the woods grape-vines are to be seen which strike their roots in the earth, indeed, but above are slung about the top of some high tree, otherwise swinging quite loose. A clinging shrub of this sort is the so-called "Supple Jack," of which I have seen neither leaves nor blooms. It grows a woody, pliant stem, one to two fingers thick and 40-50 feet long, which is often to be found hung from the end of a strong limb, and it is not easily to be guessed how it got there from the ground. I measured a few vines of the Bignonia sempervirens which were also of the thickness of a thumb, and in length 40 and 50 feet; these may be split without difficulty from end to end.

[II, 306-307.] In the middle of February, one small plant excepted,* not a bloom was to be found on James Island, although in other winters (mild as this was severe) one plant or another is at this season in bloom. I looked about to no purpose also for the "Cabbage-tree," which was once plentiful there, but now is as good as exterminated, because everywhere cut down during the war for fortifications and bulwarks. But there are a few still left on Morris and other neighboring islands, whither I had no occasion to go.

East Florida.

[II, 379-383.] All about the town [St. Augustine] the sandy soil was thickly set with a low, creeping palm (*Corypha minor L.?*) The stems trailed along the ground, the tops very little raised above the sand, but with comely, upright-standing leaves. From every old root there sprouted may stems running in various directions, and striking out fresh roots. Whole fields were covered with this growth. Here and there appeared a few upstanding trunks, of the thickness of a man's leg; from the leaf, these seemed to be the same as the rest; but there being no blooms at this time, no precise determination could be made.

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* *Houstonia* pusilla—*Radix* fibrosa, tenuis. *Caulis* pollicaris, acute tetragonus, setulis paucis (microscopio tantum observandis) scaber, simplex vel subramosus, terminatus ramis duobus et pedunculo intermedio, aut hoc tantum. *Folia* opposita, petiolata, ovata, basi apiceque acuta, glabriuscula, margine reflexo ciliata. *Petioli* longitudine fere foliorum, membrana laxa coadunati. *Pedunculus* terminalis, caula sæpe longior, tetragonus, erectus. *Flos* longe minor, quam Houstoniæ cæruleæ, erectus. *Calyx* parvus, basi hemisphæricus, quadrifidus; laciniis lanceolatis, acutis, erectis. *Corolla* infundibuliformis. Tubus calyce duplo et quod excurrit longior, medio incrassatus. Limbus tubo brevior, quadripartitus: laciniis ovatis, acutis. *Stamina* 4 in medio tubi corollæ: Antheræ flavæ. *Germen* compressum. Stigma bifidum. In habitus this is the *Houstonia cærulea*, and the bloom is so similar that I take it to be a variety of *Houstonia*, although I have not seen the fruit.

Near to the town there were to be seen a few trees of the fan-palm variety (*Borassus flabellifer L.*) The cabbage-tree or cabbage-palm (*Areca oleracea L.*) is likewise at home here, but about the town there are few of them left. They had been cut down to get the cabbage, the undeveloped, tender, white leaves at the top of the tree. This sort of palm grows tall. The edible part is brought into the town by negroes and sold at 6 pence to 1 shilling sterling.

In this southern region spring really begins hardly before the middle of March. A few trees and shrubs begin then to show leaves; the evergreen oaks, the cassio-berry, and other winter-green plants let fall at this time their last year's, but still green leaves, since the new are then developing.

In the woods and swampy places there were blooming at the time, among smaller plants: Orontium aquaticum, Drosera rotundifolia, Hypoxis erecta, Viola lanceolata, palmata, and primulifolia, Rhexia virginica, Hydrocotyle umbellata, Utricularia subulata and gibba, etc. All plants which are found as well in the provinces to the north, where however, they come out much later. Acorus calamus was plentiful in the swamps but not yet in bloom. On drier, sandy soils, and protected by palm-bush or garden fences were found blooming: Jatropha urens, Houstonia caerulea, Cistus canadensis, Veronica marilandica, Rhexia marilandica, Plantago virginica, Lobelia inflata, Antirrhinum canadense, Tradescantia virginica, Commelina communis, Oxalis stricta, Veronica serpillifolia, Verbena Aubletia, Argemone mexicana, Salvia urticifolia.

Among the smaller bush near the town several varieties of the species Andromeda, Vaccinium, the Myrica cerifera, Bignonia sempervirens, Rubus hispidus, Mespilus arbutifolia, etc., were beginning to develop blooms or were already blooming.

Prunus lusitanica, which is very common here, showed sporadic masculine and hybridous blooms. Xanthoxylum Clava Herculis grows here to strong, high trees. Ilex Cassine, Olea americana, Magnolia grandiflora, and other trees seen in Carolina, are more numerous here. Cactus Tuna is everywhere to be found.

In place of other fences about gardens and fields, the palmetto (*Yucca gloriosa*) is made use of here; the tops being cut off and set out along little ridges of earth take root easily and rapidly, grow tall and thick, and with their stiff and prickly leaves make an impenetrable hedge. In addition, their beautiful blooms offer a splendid prospect to the eye, and their sweet, mucilaginous fruit is said to be a mild purgative. The orchards contain little besides lemon and orange trees. The latter, the sweet as well as the sour, are thought to be especially good, even better than the West Indian. But the sour are the most raised. The expressed juice is sold at 1 Spanish dollar the gallon. Of both sorts there are very strong and handsome trees, yielding annually 3-4-500 oranges. I saw no apple or pear trees, and only a few peach and plum trees.

The Florida star-anis tree (*Illicium floridanum L.*) is found in the neighborhood, but is not so plentiful as in West Florida.

In certain parts of Florida the culture of the *Sesamum orientale* has been attempted, and the seed found to be so heavy that a bushel, English measure, gave more than 25 pounds of oil, not only pleasant to the taste but vaulable because it does not easily grow rancid.

Bahama Islands.

[II, 422-435.] The character of the surface makes the working of the land somewhat difficult, and this may be the reason why so many plantations on the island lie deserted and so many houses are in ruins. The situation of this island [Providence], and the number of other islands still uninhabited but supplied with various kinds of timber, opened to the settlers other less tedious and more lucrative means of support than those to be had from the monotonous and toilsome life of a planter. However, I will mention here all the products which have been essayed here.

Coffee does excellently; several large orchards full of these trees are to be seen in and about the town [Nassau]; they are growing well, bearing heavily, and the beans are of the best taste. It is therefore a matter of surprise that such plantations are not more general, since the trees once set require little more attention. The sole cause of this neglect is likely that some years must pass before any profit is to be had from a plantation.

The **Suger-cane** thrives here as well as in other of the Bahamas where it has been tried. Several miles from the town a plantation had been begun, a distillery set up, and rum prepared, but the undertaker dying the work was given over. Of the quality and growth of the cane there can be no doubt, but the rocky nature of the soil makes it impossible to devote sufficiently large tracts to the culture; the work is therefore carried on at too great cost and difficulty, and the sugar can not be got out at the same rate of outlay as that holding in the other sugar islands near-by. On the other inhabited Bahama islands the people raise just so much sugar as will supply their household necessities; they do no more than boil the juice of the cane to a thick syrup.

Indigo may be seen here and there growing in gardens, and about them, where the seed has fallen by chance and abundantly multiplied. The assertion is made by those who know, that the finest and best indigo is believed to come from the planters here; but large establishments for making it are not set up, on account of the character of the water here, and the lack of the quantity necessary for handling the indigo.

Cotton (*Gossypium arboreum L.*); the culture of this shrub is extending, not so much on Providence as on the other islands, experience having proved that this crop is one of the best and surest rewards of the planter's toil. It grows at all seasons, is not so dependent on rain as other plants, and takes quick and strong hold of the rocky soil.

Yams (*Dioscorea alata L.*) are raised everywhere in plenty, partly for family use, and also (but in no great bulk) for export to North America. The cut tubercles are once a year set in the ground, and increase extraordinarily.

Maize yields but one harvest a year, the character of the seasons not admitting of two plantings. It can not be put into the ground until the rainy season has begun, in June or July that is, and thus does not mature until November or December. So its growth is no faster here than on the American continent, where the planting is in May and the harvest in September. The dryness of the other months does not permit of a second seeding. This is the only grain produced on this island, and the quantity raised is by no means sufficient. America sends many cargoes hither to supply the lack.

The **Tamarind** (*Tamarindus indica L.*) has not become indigenous here, but is planted now and then. The trees are of a large and fine growth, with stout trunks and wide-spreading branches. The leaves of this tree, as is well known, fold up at night. The fruit is borne in quantity, pods 4-5 inches long, of a hard but brittle shell, brown in color; within, between tough, woody fibers, lies the very sour marrow which surrounds the seed. The shells are husked, and the inner parts set in earthen pots, between layers of brown sugar, and thus expedited.

As yet, very little of consequence has been done in wine-making; but it is said that the wild grapes growing here are very like the grapes of Madeira, and that some good wine has been expressed from them already.

Orange and lemon trees were at first transplanted by Europeans, but are now become quite native; almost all the known species and varieties are to be met with here. The best crop of oranges is gathered about Christmas; the August crop does not yield such agreeable fruit. The sweet oranges bear properly but once a year; but the commoner sour oranges, and the bitter-sweet, yield ripe fruit mostly throughout the year, however it is plucked in the greatest quantity at the time mentioned. More rare are the "Soursoops," (*Pumpelmus, Citrus decumana L.*) The sort produced most abundantly, and less known in Europe, is *Limes**, which are in general not much bigger than a dove's egg, round, smooth, pale in color, with no smell, but of a very sour taste. These limes are exported in great quantity, from this and the other West Indian islands, to all of North America, where they are preferred greatly for punch, being juicier and sourer than lemons. Also, the expressed juice is sent off in casks. The trees bearing this fruit are but low and bushy and commonly bend beneath the weight. Little or no attention is given them, and in places where orchards have been set, there is to be seen now little but a wilderness of bush.

Ananas or Pine-apples. There are several varieties. That more generally raised here seems to be the Ananas aculentus fructu pyramidato, carne aurea T. Many acres of land are every year set with this excellent fruit; and many cargoes exported to all parts of America and even to Europe. They are cut for export when full matured but still green exteriorly. They first begin to ripen early in May, but very little is gathered for shipping before the end of May or the beginning of June. If well and drily packed on board ship, and so kept, they stand a voyage of four to six weeks and more. The ship by which I returned to England in June, had several thousand on board, and brought them well-preserved to London, where according to the size and beauty of the fruit the selling price was 4-6-8 shillings sterling the piece. The purchase price was 4-5 shillings a dozen. They are also conserved in sugar or brandy. Even the peelings of this fruit give to rum a very pleasant taste.

But as early as the beginning of May a schooner was clearing for America with a cargo of pine-apples and limes; at that time none of the earliest fruit was to be seen in the town; but this vessel had collected a cargo on the outlying islands, of the ripest fruit, or that nearest ripe, so as to be the first off to America. In exchange they take from North America and from Europe fresh and salted meats, butter, rice, corn, wheat, etc., utensils and clothing of every description.

From these several products and the work of the negroes those who own plantations draw considerable returns. The statement is made that only from pine-apples, yams, lemons, and coffee a plantation (large to be sure) has yielded a profit in one year of 2,300 pieces of eight.

Almost all the Bahama islands, such as are not mere barren ledges or keys so-called, are thickly overgrown with bush. Although most of the trees of these islands are low and mean looking, there are found nevertheless on some of the larger islands strong, high trunks. Every man can fell wood as it pleases him and wherever he finds it; and this is a considerable source of gain to most of the families here resident, who keep their negroes constantly employed in this way, and send them hither and yon on the business. One is puzzled to see most of the white inhabitants of Providence living well and yet going about in idleness; but they live by the sweat of their slaves. Wood-cutting is gradually becoming more difficult and less lucrative. On the islands lying next Providence the best wood is always cut off, and thus there must be recourse to islands lying farther away, or the woods must be more deeply gone into; in either case the expedition of the wood felled is made more burdensome. Besides, those who have cut wood in this way, unless they own their vessels and boats, must lose in getting the wood to Providence for marketing; for the charge for freight is according to circumstances—⅓-½ of the wood.

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* Citrus fructu sphærico-ovato punctato lævi minori acido. Brown, Nat. hist. of Jamaica, p. 308, n. 1. Malus aurantia fructu limonis pusillo acidissimo. Sloane, Voyage, II, p. 182.

Mahogany is what they look for and cut oftenest. But the Bahama islands yield no such large, thick trunks as do others of the West Indies, especially Cuba, whence boards of good length and breadth are fetched. The logs taken from Providence are better adapted for pillars, frames, and other less important work. The mahogany wood which is sent to Europe from this and the other West Indian islands does by no means come from one and the same variety of tree. Besides the *Swietenia Mahogany L.**, several kinds of Mimosa and perhaps other related trees are marketed under this name. Thus it happens that so many different sorts of mahogany wood are found in merchants' warehouses and in artists' work-rooms. An uncommon sort is called here, from its color and coarse wood-fibre, the "Horse-flesh Mahogany." Another kind, paler in color, is the so-called Madeira wood, but this also passes in Europe for mahogany. This is more easily workable, and comes from the *Cedrela odorata L.* In the woods near the town we were shown several species of trees, under the name of mahogany, but none of them was the Swietenia, which, it seems, is hardly to be found any longer in the neighborhood. In the West Indies much mahogany is used in ship-building. At the time, a brig was lying here on the stocks, of which the lower part was made entirely of mahogany. Mahogany lasts longer in the water than any other wood, and it is not readily attacked by worms; but from its heavier weight it may be used only for the lower part of ships, the upper part having to be of a lighter timber. Mahogany logs sink of themselves in salt water.

The next species of wood which is cut and exported in considerable quantity is **Brasiletto** (*Caesalpina brasilensis L.*)† Its trunks are small, unsightly, and for the most part crooked. This wood does not grow at all in Carolina, appearing first in the West Indies; it may possibly be found on the point of Florida as well. Catesby has been responsible for the error, in his work which he calls *History of Carolina,* where so many subjects are included belonging to the Bahama Islands, but not always referred to their place of origin, and he has thus given occasion for regarding divers trees and plants as products of Carolina, when they are not. This wood, as is known, is used for dyeing.

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* Catesby, *Carol.* II, p. 81. t. 81.

† Pseudo Santalum croceum. Catesb., *Carol.* II, t. 51.

Lignum Vitae: under this name there is exported at times *Guaiacum officinale,* at times *Guaiacum sanctum L.*, however, the last is greatly rarer than the first. The trees are not very high, and no thicker than a man's arm or leg. Most of this wood sent from here is, from its especial hardness, used in mechanical apparatus. A great traffic in it is particularly furthered by its use on ships, where the pulleys and blocks for the rigging are made solely of this wood. Now and then gum is gathered from the trunks. The medicinal use of guaiaca wood is well known; but in addition the inner bark is employed here as an emetick. Some of it is bruised or beaten in a mortar, cold water is poured on, and the decoction let stand over-night. It has a strong effect, and is a customary household remedy in these parts. The shrub in bloom is of much beauty.

Logwood or Campeachy-wood (*Haematoxylon Campechianum L.*) is not originally indigenous here. But formerly many of the inhabitants going into Honduras Bay to cut this wood there, they brought seeds back with them and planted them here. This was done with good result here and there, and it is considered how so useful an article of trade may be further spread. The export has not yet become an important item.

White Cinnamon, Eluthera-bark, (Wild cinnamon), is produced by the Winterania Canella L. Catesb. II, t. 50, which grows in abundance on several islands, but especially on Eluthera; besides the quantity that goes to Europe, many tons of this are sent to Curaçao and other Dutch colonies, where cinnamon-water, perhaps also cinnamon-oil, is distilled from it.

Cascarilla Bark, *Croton Cascarilla L.* Catesb. II, t. 46, is likewise gathered on sundry of the islands.

Under the name of Squills (also Sea-Onions) a large onion similar to the Squilla, is collected on the sandy shore, dried, and sent to North America. The appearance of these is the same, and it is said their virtues are quite the same as those possessed by the ordinary *scilla maritima.* At this time the plant was not in flower, and I could not determine whether it is a species of the *Scilla,* or (more likely) a *Pancratium.*

[II, 483-494,] The greatest part of the plants here are everlasting and evergreen. Thus, if this group of islands is lacking in properly arable soil, easy to work, the appearance of things is none the less pleasant and cheerful. The groves, cross cut by many paths and roads, form a beautiful evergreen garden, where bloom and fruit are continually alternating. Most of the indigenous plants bloom twice a year; particularly during and after the rainy season, in June and July, and in the temperate autumn months. The months of April and May, the time of my visit, are dry and unfruitful months, during which the flora here exhibits least its beauties and rarities.

Here shrubs and trees are in great disproportion to the more delicate, annual plants, of which there are but very few. Moreover, the leaves of most of these shrubs and trees are of a firmer, parchment-like nature, and their wood is dense and heavy. Although plants of this character are better adapted for withstanding great heat, nevertheless at the time of my visit, after a persistent drought, shrubs of firm, laurel-like foliage as well as those of a more delicate leafage, stood for the most part wilted, if not refreshed now and then by a dew at night.

Of the trees, either originally indigenous or transplanted, the following are to be set down, in addition to those already mentioned, as remarkable or useful.

The Papaw or Melon-tree, *Carica Papaya L.* (Trew: Ehret, Tab. VII), is planted for its fruit in gardens or about plantations, the fruit, cooked before it is full ripe, making a not unpleasant dish. It is believed here that if it is put with hard, tough meat, the same grows softer and more digestible. The little seeds have a sharp, aromatick taste. The trees are not very tall, sparsely leaved, and of a white, spongy wood.

The Guavas, *Psidium pyriferum L.* (Guiva, Trew: Ehret. t. 43), and *Psidium pomiferum L.*, are also transplantations; they are indigenous to Hispaniola. From their fruit confitures are made, as also from that of the Mammee, *Mammea americana L.*

The Avogado-tree, *Laurus Persea L.*—On a deserted plantation behind the town [Nassau] there are a few of these trees, large and handsome. The pear-shaped fruit, which ripens in September, is excellent of taste.

The Banana-tree, *Musa paradisiaca L.*, is grown abundantly in all gardens.

The common fig tree, *Ficus Carica L.*, bears three times a year, heavily, and good fruit, and deserves to be more raised, for the fruit of the indigenous fig, *Ficus benghalensis L.*, is small, dry, and uneatable. The pomegranate also yields well-tasting fruit. Among the transplantations belong also, the Paternoster-tree, *Melia Azedarach L.*, the soap-tree, *Sapindus Saponaria L.; Nerium Oleander*, and *Magnolia grandiflora L.* Further, the Silk-Cotton-Tree (*Bombax pentandrum L.*) the seed-case of which yields a very fine, light brown wool. The tree is comely, large, and strong; the branches of the one I saw, no doubt the only one on the island, shaded a circuit of at least a hundred yards. The *Hura crepitans L.* (Trew: Ehret, t. 35) called the "Sand-box" from the use made of its seed-cases. The ripe, dry cases split with a loud clack; the unripe are bored through and used for strew-sand boxes, from their star-shaped openings being very well suited to the purpose. The seeds, like almonds in form and taste, are drastic. The fine growth of the tree makes it a favorite for shading walks, and the trunk yields excellent boards. *Aeschynomene grandiflora L.*, "Chicken-peas," a tree of very rapid and tall growth, recommends itself by its large, splendid blooms, and the seeds are good forage for poultry.

The Cashew or Acajou, *Anacardium occidentalis L.*, is met with on sundry plantations. The coco and the date-palm have both been transplanted; they thrive and bear much fruit. But the dates here are small and of a harsh taste.

Among the indigenous palms the inhabitants distinguish four different varieties, naming them, according to the use made of them, as follows:

"Great-Thatch" and

"Brittle-Thatch Palmetto"—the leaves of which are used in the roofs of their cabins.

"Silver-Thatch"—on account of the leaves being supplied below with a silver-colored down. The younger leaves are employed chiefly for making the rough nets and tackle used by the fishermen here. The top of the tree is eaten, as is also that of the

"Cabbage tree," or common cabbage palm. The soft stem of this palm is eaten by hogs.

Of the first [two?] I have seen neither blooms nor fruit. Probably they are varieties yet indeterminate. All of these grow by preference on the shore, making here and there pleasant little forests; but palms reach no great height here; at least one does not often find them more than 12-15 feet high.

To be counted among the indigenous edible fruits are: the several varieties of the custard-apple, *Annona glabra, palustris, triloba,* and *muticata L.*, the Jamaica or "Wild Cherries," *Malpighia glabra* and *urens*, which bear pleasant, sourish berries, not unlike the cherry. The sapadilla, *Achras sapota L.*, a small, round, milky fruit which, when well over-ripe is regarded by some as an especial delicacy and is used for tarts. The coco-plum, *Chrysobalanus Icaco L.* Saffrons, the fruit of a shrub with oval leaves having a brownish down beneath; in shape like cornel-berries, of a long, hard kernel, purple-colored or blue, and of a sweetish, sleek taste.

The "Pigeon-plums" (*Cerasus latiore folio, fructu racemosa purpureo majore.* Catesb. II, tab. 94) supply the wild pigeons, and the dry, yellowish fruit of the "Hog-plum tree" (*Spondias Mombin L.*) serves as food for the hogs.

The poisonous manchineel, (*Hippomane Mancinella L.*) occurs on Andros Island. The mangle-tree, *Rhizophora Mangle L.*, grows everywhere along the shores.

In the bush and the woods there are finally great numbers of varieties of splendid plants, of which at this season but few were in flower. Certain of them are peculiar to the Bahama islands, others are found throughout the West Indies, and in the warmer regions of the mainland. Not wishing to repeat all those names of plants mentioned in my description above, nor intending to give a complete list of the plants of Providence (out of the question both from the briefness of my stay and from other conditions as well), I will indicate only a few of the more common plants blooming in April and May:

Boerhaavia scandens.
Justicia spinosa.
Verbena lappulacea, curassavica and nodiflora.
Salvia serotina. The infusion is used in fevers.
Proserpinaca palustris.
Commelina communis.
Kyllingia monocephala.
Paspalum distichum.
Agrostis indica.
—— —— tenacissima, Jacquin, Ic. tab. 16. Collect. I, p. 85.
Catesbæa spinosa.
Petesia stipularis.
Cissus sicyoides.
—— —— trifoliata. (Almost smooth, and with no marked wings on the stalks. Caterpillars in the leaves.)
Fagara Pterota.
Rivina humilis and lævis.
Ilex cuneata.
Heliotropium parviflorum, curassavicum and gnaphalodes.
Tournefortia volubilis.
Convolvuli spec. (Salve-leaf.)
Ipomæa triloba, and other varieties.
Conocarpus erecta (Button-wood) and racemosa.
Psychotria asiatica.
Chiococca racemosa.
Scævola Lobelia.
Erithalis fruticosa.
Physalis curassavica.
Solanum verbascifolium, racemosum, bahamense.
Cordia Sebestena.
Ehretia trinifolia and Beureria.
Cestrum vespertinum.
Chrysophyllum Canito.
Hedera quinquefolia.
Illecebrum vermiculatum.
Vinca lutea.
Plumeria rubra.
Echites umbellata, biflora and others.
. . . Arbor jasmini folio, floribus albis, fructu ovali, feminibus parvis nigris mucilagine involutis. Catesb. I, t. 59. Seligm. Vög. 3, t. 18. (Seven years' apple.)
Asclepias curassavica, and others.
Turnera ulmifolia.
Xylophylla latifolia.
Tillandsia polystachya, lingulata and others.
Tradescantia virginica.
Pancratium caribæum?
Orontium aquaticum.
Achras salicifolia.
Bursera gummifera. Terebinthus major, etc. Catesb. I, t. 30.
Amyris sylvatica (Torch or Lightwood)—toxifera (Poison-wood). Catesb. I, t. 40. Seligm. Vög. 2, t. 80.
Amyris Elemifera, and bijuga.
Ximenja inermis (Mastick-tree).
Coccoloba Uvifera.
Paullinia Seriana.
Cassytha filiformis.
Cassia emarginata, obtusifolia, occidentalis, biflora (Pock-root), ligustrina (Wild Senna. Purgative.), and others.
Poinciania pulcherrima.

Guilandina Bonducella (Nickers).
Melastoma discolor.
Banisteria angulosa.
Suriana maritima.
Euphorbia hyssopifolia?, heterophylla, and others.
Cactus Tuna.
Eugenia Pseudopsidium.
Sesuvium Portulacastrum.
Argemone mexicana.
Corchorus hirsutus.
Bignonia pentaphylla, and cærulea.
Lantana Camara and involucrata.
Capraria biflora.
Stemodia maritima.
Durantia Ellisia.
Cleome pentaphylla.
Sida crispa, and others.
Hibiscus tibiaceus.
Abrus precatorius.
Erythrina Corallodendron. Trew, t. 8.
Cytisus Cajan.
Hedysarum canescens.
Indigofera argentea.
Dolichos, sundry varieties.
Bidens nivea.
Ageratum conyzoides.
Amellus umbellatus?
Buphthalmum frutescens.
Serapias and Limodorum, sundry varieties.
Passiflora cuprea, rubra, Vespertilio, and others.
Helicteres jamaicensis, Jacquin.
Arum sagittæfolium.
Parthenium Hysterophorus.
Guettarda speciosa.
Croton Cascarilla, glabellum, argenteum.
Smilax, sundry varieties.
Juniperus bermudiana.
Andropogon repens. Gramen dactylon americanum cruciatum, barbadensibus nostratibus Dutch-grass dictum. Pluk., Phyt. tab. 189, fig. 7, and tab. 245, fig. 1.
Clusia rosea, flava.
Gouana domingensis.
Mimosa circinalis. Cat. II, t. 97, pernambucana, unguis cati, farnesiana, arborea, glauca, and others.
Pisonia aculeata.
Acrostichum aureum, polypodioides.
Asplenium rhizophyllum, marinum.
Polypodium phyllitidis, pubescens.
Adiantum clavatum.
Zamia pumila. Trew. t. 26.

ABBREVIATIONS.

1. Gr. virg.—Gronovius: Ed. 1762, description of Virginia plants collected by John Clayton.
2. Mill.—Philip Miller, various works on gardening and arboriculture.
3. Pluk. alm.—Leonard Plukenet: Almagestum.

ADDENDA.

The Lloyd Library can not resist making a brief recognition of the services Dr. Morrison has rendered to the recipients of the Lloyd Library publications. The foregoing Bulletin is of particular value, in that it carries so much useful and authoritative information concerning the early record of American drugs, medicines, and related subjects. Dr. Morrison has, in this painstaking contribution, served the interests of professional men in the sciences concerned, particularly in botany, medicine, and materia medica.

The complete book, *"Travels in the Confederation,"* by Dr. Johann David Schoepf, (see *Introduction*), published in two volumes in Erlangen, Germany, in 1788, has been translated into English by Dr. Morrison, and is now in press, as a subscription work, in two volumes, price, $5.00. It behooves the recipients of our Bulletins to address immediately Dr. Alfred J. Morrison, Hampden Sidney, Virginia, enclosing the subscription price of this invaluable work, which should be in every established library connected with the subjects embraced.

Let us again express to Dr. Morrison our grateful acknowledgments for his self-sacrificing efforts.

Respectfully, THE LLOYD LIBRARY,
John Uri Lloyd, *President.*

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BULLETIN No. 17. · 1911. PHARMACY SERIES, No. 3.

BULLETIN
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LLOYD LIBRARY
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BOTANY, PHARMACY AND MATERIA MEDICA

J. U. & C. G. LLOYD
CINCINNATI, OHIO

PHARMACY SERIES, No. 3

GELSEMIUM

A Study that Embodies the Recent Work of
PROFESSOR L. E. SAYRE,
LAWRENCE, KANSAS,

Together with Fragments of a Paper Read by Him Before the American Pharmaceutical Association, Richmond, Virginia, 1910.

Accompanied by a Plate of Physiological Tracings by Professor H. W. Emerson.

Publications Issued by The Lloyd Library

(Complete List to January 1, 1911.)

Bulletin of the Lloyd Library of Botany, Pharmacy, and Materia Medica

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The Indian Doctor's Dispensatory, being Father Smith's advice respecting diseases and their cure, by Peter Smith, of the Miami Country, 1813.

No. 3. Mycological Series No. 1.
The Genera of Gastromycetes, by C. G. Lloyd.

No. 4. Pharmacy Series No. 1.
References to Capillarity to the end of the year 1900, being Chapter VII of "A Study in Pharmacy," by John Uri Lloyd.

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The Geastrae, by C. G. Lloyd.

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Materia Medica Americana, Potissimum Regni Vegetabilis, by Johannes David Schoepf, 1787.

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No. 10. Reproduction Series No. 6.
Hydrastis Canadensis.

No. 11. Reproduction Series No. 7.
Life and medical discoveries of Samuel Thomson and a history of the Thomsonian Materia Medica.

No. 12. Pharmacy Series No. 2.
The Eclectic Alkaloids, Resins, Resinoids, Oleo-Resins, and Concentrated Principles, by John Uri Lloyd.

No. 13. Mycological Series No. 4.
Synopsis of the Known Phalloids, by C. G. Lloyd.

No. 14. Mycological Series No. 5.
Synopsis of the Genus Hexagona, by C. G. Lloyd.

No. 15. Botany Series No. 1.
Catalogue of the Ferns and Flowering Plants of Cincinnati, Ohio, and Vicinity, by W. H. Aiken.

No. 16. Botany Series, No. 2.
Reise durch einige der mittlern und sudlichen vereinigten Nordamerikanischen Staaten nach Ost-Florida und den Bahama Inseln unternommen in den Jahren 1783 und 1784, von Johann David Schopf, Erlangen, bey Johann Jacob Palm, 1788.

No. 17. Pharmacy Series, No. 3.
Gelsemium. A study that embodies the recent work of Prof. L. E. Sayre, Lawrence, Kansas, together with fragments of a paper read by him before the American Pharmaceutical Association, Richmond, Virginia, 1910, accompanied by a plate of physiological tracings by Prof. H. W. Emerson.

Bibliographical Contributions from the Lloyd Library

No. 1. Catalogue of the Periodical Literature in the Lloyd Library.

Mycological Writings of Mr. C. G. Lloyd

Mycological Notes, No. 1 to No. 36, 1898-1910.
Mycological Notes, Old Species Issue, No. 1, 1908.
Mycological Notes, Polyporoid Issue, No. 1 to No. 3, 1908-1910.
Letters, No. 1 to No. 26, 1904-1910.
A Compilation of the Volvae of the United States, 1898.
The Genera of the Gastromycetes, 1902.*
The Geastrae, 1902.*
The Lycoperdaceae of Australia, New Zealand, and Neighboring Islands, 1905.*
The Tylostomeae, 1906.
The Nidulariaceae, 1906.
The Phalloids of Australasia, 1907.
Synopsis of the Known Phalloids, 1909.*
Synopsis of the Genus Hexagona, 1910.*
Synopsis of the Sections Microporus, Tabacinus, and Funales of the Genus Polystictus, 1910.

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* Published also as a Bulletin of the Lloyd Library of the Mycological Series.

GELSEMIUM AND ITS ACTIVE CONSTITUENTS.*

It is generally conceded by the medical profession that Gelsemium is one of the most important drugs of our materia medica, and yet, it is interesting to note, there is some confusion regarding its action. As a consequence there must be some uncertainty and lack of confidence in its therapeutical application. Much of this arises from ignorance of its chemical constitution. If one knows exactly the nature of the chemical constituents of a given drug, he can better comprehend its therapeutic action, more intelligently apply it, and with more confidence select from its various preparations—and thus obtain more definite results. Not until chemists informed practitioners of the nature of the constituents of aconite, showing, among other things, that in the drug there existed not only aconitine, but other possibly antagonistic principles, and that the important alkaloid, aconitine, was quite susceptible to hydrolysis, was it quite possible for physicians to prescribe its preparations satisfactorily. A closer study of the constituents of Gelsemium, in like manner, promises to yield the same kind of beneficial result. Gelsemium has seemed to have, in the hands of many physicians, two different specific actions; the one, if not antagonistic, seems to interfere with, or interpose, the action of the other. One of these actions may be characterized as a muscular paralytic action through the spinal cord, and the other a circulatory depressant action through the vagus center, slowing the heart and lowering blood pressure. It is this latter action for which the drug is highly prized. It acts, in this heart reduction and in this reduction of blood pressure, quite differently from aconite, and we are inclined to think more satisfactorily if the proper principles of the drug are utilized.

It has not been determined exactly what are the specific actions of the different principles of Gelsemium. This is due partly to the fact that they have not been separated and thoroughly purified—the different principles are so apt to combine that their entire separation, in the state of purity, is quite difficult. When these principles have been isolated and purified, and their physiological action studied, physicians will better know when and how to employ the drug and select its preparations.

The present paper will endeavor to throw some light upon the organic principles of this interesting drug, and, in a preliminary way, to discuss their physiological action—thus paving the way for future work.

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*Some of the material in this article was embodied in a paper read before the American Pharmaceutical Association, Richmond, Va., 1910, and will appear in its annual proceedings.

The two important constituents of the drug have been named *Gelsemine* and *Gelseminine* respectively. The last named alkaloid has not as yet been satisfactorily defined, as it has not been sufficiently purified.

What has been recognized hitherto as gelseminine is a soft, resinous, alkaloidal residue remaining after gelsemine hydrochloride has been crystallized from alcoholic solution of the mixed alkaloids. Thompson[1] first announced this as a second alkaloid. Cushny regarded it as a powerful poison resembling coniine. Whether this is a distinct alkaloid, a polymerized form of gelsemine, a mixture of various uncrystalline principles of unknown composition, has not been determined. Our work recently has indicated that it is a complex substance. We have been able to separate it into at least two distinct bodies, having different solubilities and different reactions with agents.

The crude gelseminine for our work was obtained by the Thompson method and by two different modifications of his process, as follows:

METHOD A.

A one-fourth portion of a soft alcoholic extract obtained from 50 pounds of drug[2] was treated with a 2 per cent solution of H_2SO_4, the acid solution thoroughly washed with chloroform by which all the gelsemic acid seemed to be removed. The acid solution was made alkaline and shaken with ether-chloroform (5 to 1) until exhausted and the separated ether layer washed with 2 per cent hydrochloric acid. On concentrating this liquid in vacuo, the residue consisted mostly of soft, resinous-like, reddish, gelseminine hydrochloride; seemingly very little or no white alkaloid gelsemine was present.

METHOD B.

In this case the soft extract (¼ portion) was first treated with an equal bulk of lime and dried, after which it was treated with 2 per cent H_2SO_4. The acid solution was washed with chloroform and the subsequent treatment was precisely similar as in Method A, using the solvent in the same order. The final acid aqueous washing of the chloroform-ether solution of the alkaloids was concentrated in vacuo to small volume. The evaporation was continued to dryness and the dry product powdered. The powder, which was quite dark, was treated with U. S. P. alcohol. This left 2.1 Gm. of the colorless salt, gelsemine hydrochloride.

The separated alcoholic solution was concentrated and set aside to crystallize, but no more crystals appeared. The concentrate corresponded to Thompson's gelseminine. It was a red, soft, gummy, resinous mass, with strong alkaloidal reaction, and had a very bitter taste.

METHOD C.

A third portion, consisting of the remaining half of the original extract, after making alkaline, was extracted with benzol. The solution was filtered and shaken out with 2 per cent H_2SO_4; the acid solution was then washed with chloroform to remove gelsemic acid. The subsequent treatment with the immiscible solvents was the same as in Method A, the liquids being used in the same order. The acid solution was then concentrated in vacuo to small volume and set aside to crystallize.

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[1] Pharmaceutical Era, 1887, p. 3.
[2] Proceedings American Pharmaceutical Association, 1909, p. 902.

Colorless crystals of gelsemine hydrochloride separated, which, after washing with U. S. P. alcohol and drying in vacuum desiccator, weighed 11.5 Gm. This method gave the largest yield of gelsemine hydrochloride. The liquid from which the crystals were removed gave, on concentration, a residue characteristic of Thompson's gelsemine hydrochloride.

All of these products (crude gelseminine) from Methods A, B, and C were separately subjected to further examination in the hope of obtaining more definite information concerning this soft, resin-like alkaloid.

It may be well to state in passing that crude gelseminine gives with manganic oxide and H_2SO_4 a purple color, while gelsemine gives a cherry-red. The final color of gelsemine merges into green, fading to a yellow.

The suspicion has been entertained that the so-called gelseminine consists of possibly a mixture of coloring matter and another alkaloid persistently combined therewith. The persistent "combination" referred to has not thus far been possible to break up by any ordinary means of alkaloidal separation. Thompson's gelseminine is, by another theory, a derivative of the colorless alkaloid or of esculin, having somewhat the same relation to gelsemine, as does chinoidine to quinine. Indications seem to be that gelseminine, when obtained pure, will prove itself to be a colored alkaloid, producing colored salts.

It might be well to state here also that the physiological tests of the crude gelseminine hydrochloride, formerly produced by us, indicate that it differs from gelsemine, in being about ten times more toxic than gelsemine.[3] Cushny, as before stated, found that its action was very similar to that of coniine, was more depressant to the central nervous system, and had mydriatic properties, but as such was too irritating for practical use. Some authorities state that the effects of the crude drug are mainly due to the uncrystalline alkaloid gelseminine, and not the crystalline gelsemine. In order to study the constitution of this gelseminine, it is evident that it must be brought to a more definite physical and chemical condition. In attempting to do this, the three crude gelseminines, A, B, and C, as above stated, were made the starting point.

Examination of Crude Gelseminine (A).—This consisted of a reddish colored product, which when dried in a current of warm air weighed 19.92 Gm. This product, by solution in acidulated water, precipitation by ammonia, washing out by immiscible solvents, twice repeated, yielded crude crystals of the colorless gelsemine hydrochloride, which when purified weighed 0.6556 Gm. It was thus made clear that a fair proportion of the so-called crude gelseminine (A) consisted of the alkaloid gelsemine.

All attempts to purify or crystallize the remaining soft, resinous, alkaloidal substance from which the gelsemine hydrochloride had been separated was of no avail. It persistently remained as a colored mass which dried, in a thin layer, into a hygroscopic, scaly salt.

Examination of Crude Gelseminine (B).—Treated with absolute alcohol it was found to be not entirely soluble. 6.5 per cent remained undissolved, but the insoluble portion could not be deprived of its coloring matter. It was probably a mixture of gelsemine and gelseminine.

1.6355 Gm. of crude gelseminine (B) containing 17 per cent of moisture, corresponding to 1.2574 Gm. of dried material, was precipitated from an acidulated solution by means of ammonia in excess.

The liquid containing the suspended alkaloid was transferred to a filter and continuously washed with ammoniacal water until the washings ceased to show presence of alkaloid.[4] The residue on the filter was then transferred to ammoniated water and allowed to macerate for several hours. The liquid was transferred to a filter and again washed as before. The insoluble precipitate was carefully dried in a vacuum desiccator. It weighed 0.4752 Gm., thus indicating a distinct separation. One of these separated products (insoluble in ammonia) we designate as gelseminine (B_1), the other (B_2).

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[3] Dr. E. D. Reed, Pharmacologist. See Proceedings A. Ph. A., 1906, p. 865.

[4] We have noted before that some of the alkaloids of gelsemium seemed to be remarkably soluble in ammonia.

The ammoniacal filtrate was separated into three portions; the first portion passing through the precipitate and filter was of a pinkish color; the second portion was less colored, and the third portion colorless. These three solutions were separately dried in a vacuum desiccator, which was supplied with a current of air made dry by a battery of Woulfe bottles containing sulphuric acid, and finally a U-tube of calcium chloride, a partial vacuum being maintained. Practically dry products were thus obtained; Gelseminine, B_2 (Gelsemoidine [?]).

The first residue[5] was brittle and of a reddish color. The second residue was of a lighter yellow, and the third was practically colorless. All three were alkaloidal—the third, colorless residue, was also alkaloidal and contained insoluble material. The total weight of the alkaloid soluble in ammonia was 1.1584.

(B_1): The precipitate insoluble in ammonia was first dissolved in dilute sulphuric acid, transferred to a separator, made alkaline with ammonia; the alkaline solution washed with chloroform, which readily extracted the colored alkaloid. The chloroform solution was transferred to a second separator, and after washing with distilled water was extracted with dilute hydrochloride acid. This last washing removed practically all of the color and the alkaloid. This was placed in a vacuum desiccator and dried the same as the former solution. The weight was 0.4572 Gm.

It should be noted here that the alkaline aqueous reddish solution (B_2) when washed with chloroform, yielded practically no color or alkaloid, the coloring matter as well as alkaloid remaining in the alkaline fluid. On the other hand, the alkaloid from B_1, with its red color was readily transferred to chloroform when its solution, made alkaline, was shaken out by that solvent.

Examination of crude Gelseminine (C).

Treated with absolute alcohol, this was found to be entirely soluble.

1.435 Gms. of Gelseminine (C) containing 10 per cent of moisture was taken, precipitated by ammonia, and succeeded by the same treatment as that to which the former product (B) was subjected. The precipitate insoluble in ammoniacal water weighed 0.0835 Gm. (5.81 per cent), and had the same characteristics as the former insoluble precipitate.

PHYSIOLOGICAL EXPERIMENTS.

To study the effect of the three different principles (gelsemine, "gelsemoidine" (?) and gelseminine) on the circulation and to make at least a rough comparison of their physiological activity, a standard solution of each was made so that each $\frac{1}{10}$ of a cc. represented 0.001 Gm. of the alkaloid. Fractions of these solutions, or portions of a millegram of the alkaloid, or alkaloidal salt, were injected into the lymph sac of a frog. These were of about the same body weight; their heart-beats, at the beginning of the experiment, were about the same—60 beats per minute. The quantity of the alkaloid, or its solution, was varied so as to produce a given result—noting the quantity as well as the time to produce this. In the case of Gelsemine and Gel-

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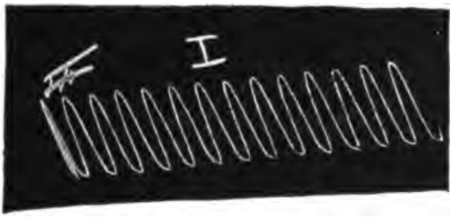
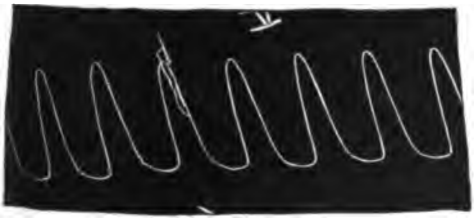
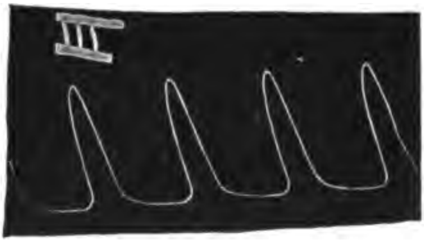
[5] This was necessarily contaminated with a small proportion of NH_4 Cl.

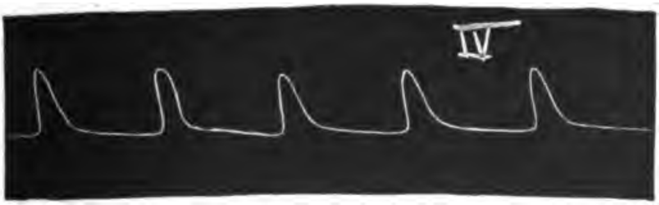
PHYSIOLOGICAL ACTION OF GELSEMININE

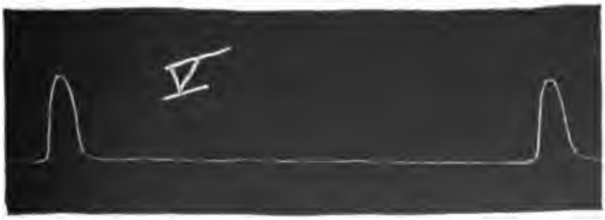
Weight of frog, 33 Gm. Normal heart rate, 65.

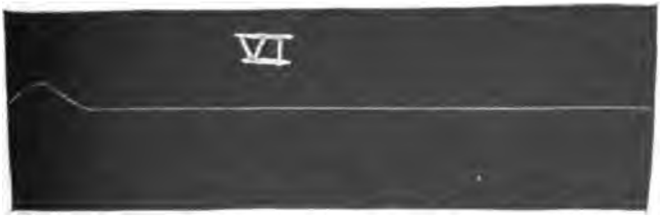












For all of these physiological experiments I am indebted to my associate, Professor H. W. Emerson. (See pages 3 and 4.)

semoidine (soluble in ammonia), the heart-rate was reduced to 5 beats per minute, and in the case of Thompson's crude Gelseminine and purified Gelseminine (insoluble in ammonia), the heart-beat was reduced to zero. The following results were thus obtained:

1—Gelsemine hydrochloride: 0.0018 Gm. reduced the beats to 5 per minute in 1 hour and 30 minutes.

2—Gelsemoidine (soluble in ammonia): 0.0032 Gm. reduced the beats to 5 in 10 hours and 30 minutes.

3—Thompson's Gelseminine (crude alkaloid): 0.0015 Gm. reduced the pulsations to zero in 5 hours and 40 minutes.

4—Gelseminine purified (insoluble in ammonia): 0.0011 Gm. reduced pulsations to zero in 4 hours.

Sphigmographic tracings were made which graphically confirm the opinion that:

1—Gelsemine hydrochloride, contrary to statements formerly made by pharmacologists, has an inherent power as a heart depressant, preceded by a period of excitation.

2—The alkaloid soluble in ammonia (B_2), which if found to be a separate alkaloid we may name gelsemoidine, is less powerful as a heart depressant than gelsemine, and it is suspected of a paralytic action. To be fully determined later.

3—The alkaloid gelseminine (insoluble in ammonia), is a typical heart depressant.

A reproduction of the tracings is perhaps unnecessary, but those tracings showing the progressive action of the purified gelseminine may be of value. The gradual slowing of the pulsation, in direct proportion to the alkaloid administered, is quite marked, and with this action there seems to be no muscular twitching, as in gelsemoidine, showing a purely circulatory depressant action.

10.40 A. M. Injected 0.2 Cc. of the above solution.

10.55 A. M. Heart rate 60. 11.10 A. M. Heart rate 54. 11.15 A. M. Heart rate 49. 11.30 A. M. Heart rate 40.

11.30 A. M. Injected 0.4 Cc. of the solution.

11.45 A. M. Heart rate 30. 12.00 M. Heart rate 28. 12.40 P. M. Heart rate 26. 1.05 P. M. Heart rate 23.

1.10 P. M. Injected 0.5 Cc.

1.40 P. M. Heart rate 10. 1.52 P. M. Heart rate 8. 1.57 P. M. Heart rate 6. 2.20 P. M. Heart rate 5. 2.40 P. M. Heart ceased to beat.

To determine relative toxicity:

Four frogs of about equal weight—weights from 30 to 35 Gm.—were taken:

EXPERIMENT 1.

	10.00 A. M.	10.30 A. M.	11.00 A. M.	11.30 A. M.	12.30 P. M.	3.00 P. M.	8.00 P. M.	8.00 A. M.
Prep. 1.....	0.7 Cc.	Normal	0.5 Cc.	Very weak	Dead.			
Prep. 2.....	0.7 Cc.	Nearly normal	0.5 Cc.	Weak.	Very weak.	Very weak.	Very weak.	Dead.
Prep. 3.....	0.7 Cc.	Nearly normal	0.5 Cc.	Excited.	Very weak.	Very weak.	Dead.	
Prep. 4.....	0.7 Cc.	Quite depressed.	0.5 Cc.	Dead.				

EXPERIMENT 2.

	10.00 A. M.	10.30 A. M.	11.00 A. M.	11.30 A. M.	12.00 M.	3.00 P. M.	6.00 P. M.	8.00 A. M.	10.00 A. M.
Prep. 1.	0.1 Cc.	Normal.	0.1 Cc.	Depressed.	0.1 Cc.	Depressed.	Dead.		
Prep. 2.	0.1 Cc.	Normal.	0.1 Cc.	Excited.	0.1 Cc.	Excited.	Depressed.	Dead.	
Prep. 3.	0.1 Cc.	Normal.	0.1 Cc.	Slightly depressed.	0.1 Cc.	Depressed.	Very weak.	Dead.	
Prep. 4.	0.1 Cc.	Normal.	0.1 Cc.	Depressed.	0.1 Cc.	Depressed.	Very weak.	Nearly dead.	Dead.

EXPERIMENT 3.

	10.00 A. M.	10.30 A. M.	12.00 M.	3.00 P. M.	6.00 P. M.	8.00 A. M.	10.00 A. M.	12.00 M.	4.00 P. M.	6.00 P. M.
Prep. 1.	0.1 Cc.	Normal	Normal	0.1 Cc.	Depress'd	Dead				
Prep. 2.	0.1 Cc.	Excit'd	Excited	0.1 Cc.	Excited	Nearly Normal	0.1 Cc.	Excited	Dead	
Prep. 3.	0.1 Cc.	Normal	Slightly excited	0.1 Cc.	Depress'd	Slightly depressed	0.1 Cc.	Very depressed	Very depressed	Dead
Prep. 4.	0.1 Cc.	Normal	Normal	0.1 Cc.	Depress'd	Normal	0.1 Cc.	Depress'd	Depress'd	Slightly depressed

ANALYSIS (COMBUSTION) OF GELSEMINE HYDROCHLORIDE.

The combustions of Gelsemine Hydrochloride were carried out in the usual way, using a silver spiral to take care of the chlorine and a reduced copper spiral to break up nitrogen oxide compounds.

Combustions for carbon and hydrogen:

No. 1. Carbon 66.48 per cent. Hydrogen 6.46 per cent.
No. 2. Carbon 66.34 per cent. Hydrogen 6.41 per cent.
Combustions for Nitrogen:
No. 1. Nitrogen=5.68 per cent.
No. 2. Nitrogen=5.59 per cent.
Carius Method for determination of chlorine:
No. 1. Chlorine=13.00 per cent.
No. 2. Chlorine=13.60 per cent.
Oxygen by Differences:
No 1. —7.78.
No. 2. —8.66.

Formula for Gelsemine Hydrochloride, using the atomic weights of United States Pharmacopœia. H=1.
$C_{14}H_{18}NOHCl$.

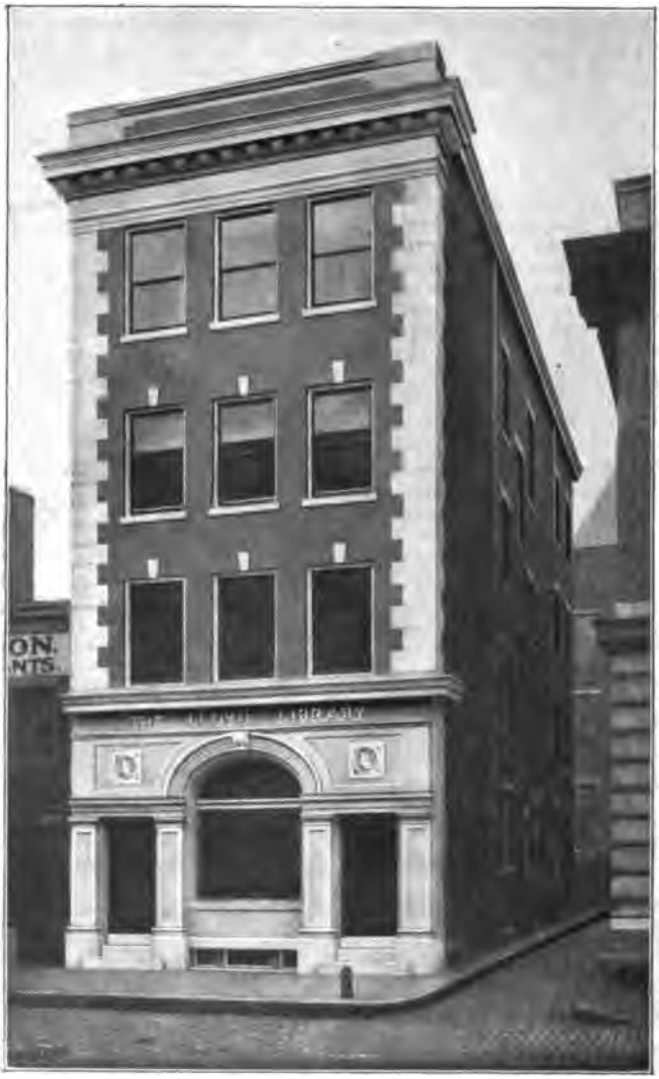
Percentage of

II.

Above Formula.	Obtained by Combustion.	
C=67.807 per cent	66.48 per cent. 66.34 per cent.	
H= 6.458 per cent	6.46 per cent. 6.41 per cent.	
N= 5.623 per cent	5.68 per cent. 5.59 per cent.	
O= 6.410 per cent	7.78 8.66	By difference.
Cl=14.202 per cent	13.00 13.60	By Carius.

The formula then for the alkaloid would be $C_{14}H_{18}NO$.

It will be noted that this is a different molecular formula for this alkaloid than that obtained by Thompson and Gerrard (Phar. Era, Jan. 1887, p. 3).



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BULLETIN No. 20. 1912. MYCOLOGICAL SERIES, No. 6.

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J. U. & C. G. LLOYD
CINCINNATI, OHIO

MYCOLOGICAL SERIES, No. 6

Synopsis of the Stipitate Polyporoids

By C. G. LLOYD

REV. G. BRESADOLA.

Who has in my opinion, the best critical knowledge of foreign Polyporoids and to whom I am indebted for many determinations and advice, I beg to dedicate this pamphlet in appreciation of the many kindnesses received from him.—C. G. LLOYD.

THE STIPITATE POLYPOROIDS.

The subject of the polyporoids is quite extensive, embracing as it does about three thousand alleged species. We have been engaged in the study now two or three years, but except in a general way have not been able to cover the entire field. We would divide them roughly into about five divisions as follows:

1st, The stipitate species, embraced in this pamphlet.
2d, The genus Fomes.
3d, The genus Polyporus, sessile section.
4th, The genus Polystictus, sessile section.
5th, The allied genera such as Favolus, Laschia, etc.

During the past two or three seasons we have visited all the museums of Europe and America where most of the historical material is preserved, and have made our studies, notes, and photographs of the type specimens. This embraces the museum at Kew, the British Museum at London, the museums of cryptogamic botany at Paris, Leiden, Berlin, and Upsala. We have looked over a small collection at Copenhagen, and some of the specimens in the private collection of Professor Patouillard at Paris. We did not have time to thoroughly work over Patouillard's species while in Paris, hence a number of his species are unknown to us. In America in our own collection we have more American specimens than there are in all the other museums combined. We have thoroughly studied the collection of Professor Peck and the specimens of Schweinitz at Philadelphia. The New York specimens we have not seen, as on both of our visits to New York Mr. Murrill was absent and we did not wish to work with his material in his absence.

Our final work on this pamphlet was done at Kew, during February, March, and April, 1911. There is no other institution in the world where one can work to such advantage as at Kew, where there is not only the largest collection of historical specimens, but the most perfect library, and where the conveniences are best.

The conclusions recorded in this pamphlet are our own, made on examination and study of authentic material. We have not indulged in the too common practice of passing on species we never saw. We may be mistaken in some of our opinions, but we have perpetrated no fraud. When we record a species as unknown, this means of course that it is unknown to us. In a few instances where we have not seen specimens we have adopted the opinion of the Rev. Bresadola, but in each such case this is distinctly stated.

The first and we think the best division of the pore species was made by Fries (1851) in his Novae Symbolae. At that time but relatively few plants were known, but Fries' divisions were based in the main on the most prominent characters, and of the eleven sections into which we have divided the stipitate species, nine of them have been taken mostly in their original signification from Fries' work. Professor Patouillard has outlined a plan of division which we think on the whole is not as good as that of Fries, but it embraced a few new ideas and two of them, the sections Ganodermus and Amaurodermus we have adopted.

In addition there has been no lack of men who have amused themselves by inventing new names for the sections of polypores. In the start we have Karsten who was the first to engage in such work. He discovered that most of Fries' sections were "new genera" and gave them names. The work had so little merit and had evidently so little originality as a whole that although proposed thirty years ago, no one except the author has followed it since, and it figures, when it has figured at all, chiefly in synonymy.

Monsieur Quélet, a leading French mycologist, learned the greater part of what he knew from Fries and his works, and in his first publication could not find words to express his appreciation of the "grand mycologue d'Upsala." After he had gotten a little insight into the subject he passed the latter part of his life juggling the names of his great master, and he did it so thoroughly that very few of his colleagues, even in France, have ever been disposed to use his work. This is unfortunate, for Quélét was a field mycologist and knew well the species that occur in France. As far as I have been able to decide there was no system or logic to his juggling, his only object apparently being to propose names in place of Fries' names.

Schroeter would divide the Polyporus species into three genera on the color of the spores and context, which while answering very well for the few species that he knew, if generally applied would bring the bulk of them, about a thousand, into one genus.

The last man to engage in this line of name changing is Mr. Murrill, who has no more trouble discovering "new genera" and concocting new names than if there had not been three men doing exactly the same thing with the same plants before him. I question if there is an institution or mycologist in Europe that attaches any importance or pays any attention to this kind of work, and very few in America. In my opinion such work is of little value or avail.

The principal work that these men do is to get up new "generic" names on various pretexts, and of course one can make a "genus" out of every species if he wants to. Their chief work, however, is to take the old sections of Fries' genera and then juggle up excuses to give them new names usually under the cover of some "rule." Such work, in my opinion, has so little to commend it that I do not consider it worth citing in detail even as synonyms.

When Fries proposed the divisions of the subject he knew but very few species, but in the years that have followed "new species" have been published in quantities, chiefly by Berkeley, who proposed so many of them that no one has been able to do much with them since. He was not, however, the only one to name foreign species, although he named a large part of them. Twenty-five per cent of the species considered good in this pamphlet were named by Berkeley.

In the early days Klotzsch and Junghuhn named quite a number. Then came Fries, Montagne, and Berkeley. Then Léveillé and Cooke, and Kalchbrenner. In the latter years we have Hennings, Patouillard, and Murrill. It would be more accurate to state that they named collections, for I do not think that any of them knew much about what the others had done, and it has been very much of a haphazard proceeding from the beginning.

Junghuhn and Montagne, I think, did the best work, or rather the specimens they left are the best. Fries' foreign specimens have largely disappeared and many of them will never be known. Kalchbrenner did the worst work of anybody and renamed as "new species" the commonest, old, well-known things. He did not seem to have had the most elementary idea of the subject. Léveillé's work was in the main very poor, and Murrill's recent work is almost as bad. Berkeley, Hennings, and Patouillard have named as new a large part of the collections that come into their hands. Naturally they got a number that are good, and many that I think are not. Spegazzini grinds the "new species" out by the wholesale from South America, but very few of his specimens reach Europe, and such as have are largely misnamed. I think no one knows what he is doing, not even he.

Very little can be told from any "description" that can be drawn from a Polyporus, and the most of the determinations that are made from "descriptions" are wrong. The only way to get names for the plants is to hunt them up in the various museums where they are preserved, and then it is often not satisfactory. One finds the same thing named over and over again. Names based on little frustules that never did give the slightest idea of any character and many other irregular things that would not be tolerated except in "Science." I believe Bresadola to be the only man in Europe who has made an earnest effort to hunt up and learn the characters of the "old species" of Polyporus in the various museums of Europe to-day. I do not always agree with him in all the details, but I think no two who endeavor to learn names for fungi from the fragmentary, indefinite, and conflicting specimens on which the names have been based will ever agree in all cases.

Cooke tried to arrange the names according to the Friesian system, but owing to the number of species and the hurried manner in which the work was done, it was very inaccurate and in its details was most erroneously done. This was not all Cooke's fault. Many of the "new species" are described in such a way that not only can nothing be told about their identity, but in many cases from the description one can not even place them in the section where they belong. In this pamphlet, when species stated to be unknown (to me) are placed in sections, I do not claim that such disposition is anything more than a guess.

Having nothing else to follow, Saccardo adopted Cooke's arrangement, which is quite unfortunate, as Saccardo is used as a basis of classification in most museums, and by this method species are brought into the same division that have little resemblance and often no relation.

In this pamphlet the stipitate species are divided into eleven sections, or genera if one so desires to call them, but we prefer to call them sections. We disclaim having discovered any "new genera" or anything else new in the classification. Nine of our divisions we have taken from the work of Fries and two from that of Patouillard. If we have succeeded in arranging the species where they belong in these sections that will be enough "novelty" to satisfy us, for we think it has not been even approximately done before.

As this pamphlet is proposed simply as an arrangement of the species, we have given but very brief descriptions, in fact only the more salient points. We think very few species are ever learned except from specimens, and that the largest part of the bad Latin that is used in describing species is purely a waste of good printer's ink and of no avail whatever as far as identifying the species is concerned. We have introduced a number of photographs that will be found to be of more service in this respect than the most minute descriptions that could be written. We have not given in detail the source of these illustrations, but we believe them to all be true to name, and the greater part of them are made from the type specimens.

As to nomenclature we have employed the sectional name as the first binomial (except in one case where it would produce the barbarism called tautology) and these sectional names are all old and familiar and will not lead to any confusion. If these sectional names are taken as genera, it is absolutely senseless to record who used the sectional name first as a generic name for any particular species. Mycologists are so very busy recording in great detail *who* did this and *who* did that, and *who* called it this and *who* called it that, and *who* made this combination and *who* made that combination, that they often have little time left to consider *what* was done.

As to specific names, in the body of this work we have not added personal names to the specific names, believing that in the case of most of the plants the authors being dead, it would not serve the usual purpose of ministering to self-conceit. We have given them in our synonyms where we think they are quite appropriate. We have given these names also in our index, according to the wishes of the authors in most cases, although not all. Some writers are so selfish they wish to advertise only themselves, others divide the advertisement with a collector or with a friend. It has been suggested that it would be a gracious thing to give all the advertisement to the collector, and I think the latter is the best plan, at least I adopt it in this pamphlet where I am concerned. In several cases in arranging the species it occurs that sometimes two in the same section have the same specific name. We have made no change, merely indicating the second by the word bis and would prefer to leave the work of changing names to others. We have endeavored to make this pamphlet a practical summary of what is known (to us) on the subject, and have indicated by the size of the type the relative value of the species as they appeal to us. Those printed in the larger type are the leading marked, characteristic species which we believe have merit and value. Those in smaller type are forms or doubtful species or plants imperfectly known to us. Where I have not seen and studied a species I usually place it in the section "unknown" (to me) for I think there is nothing gained by my guessing a second time concerning what was in many cases largely an original guess. If I have done any guessing as to the identity of those specimens I have not seen, I have plainly so indicated it in each instance. The eleven sections in which the species are divided being mostly the old, familiar sections, need little explanation. The two that are least known are the sections Ganodermus and Amaurodermus, which at our hands have undergone changes of gender in order to be uniform with the others.

The section Ganodermus was first proposed for the common Polyporus lucidus of Europe. There are but few species in temperate regions, but it is more common in the tropics. The main characters are usually a strongly laccate surface, colored context, and the real character is a spore character. The spore (Fig. 395) has a hyaline membrane or epispore which is large and projects at the base beyond the colored endospore. This empty base usually collapses, then the spore becomes truncate at the base. It has been stated that this is not the base but the apex of the spore, a statement I do not believe.

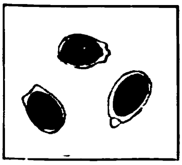

Fig. 395.

Amaurodermus is a tropical section. All species have stems, usually central but also lateral. The surface is generally dull and the stems velutinate. The spores (Fig. 396) usually in abundance, are colored, globose or oblong, large, and the endospore fills the epispore. The apiculus is rarely prominent. We have included in this section several thin species in which we have not found the spores and which we doubt really belong to it.

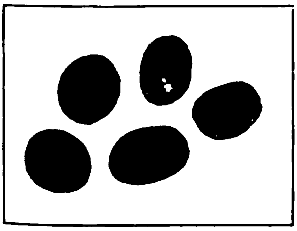

Fig. 396.

The other sections that we adopt are the well-known sections of Fries' system that need no special explanation other than our key. Some species present characters that would place them in two sections. In such cases we use our own judgment in placing them where we think they best belong. The names for the sections are mostly the same that Fries used. In one case, Perennis, we use another name, Pelloporus, for reasons we have previously stated, viz., the plants are not perennial.

KEY TO THE SECTIONS OF STIPITATE POLYPOROIDS.

There are included here only the stipitate species of the old genus Polyporus. The allied genera as Favolus, Laschia, etc., are not here considered.

Sub-woody.

With woody fibrils but not perennial and not having the pores in strata (except as to the first).
Pores in areas of growth (indistinctly stratified) ....Fomes.

Pores Not Stratified.

Spores colored (mostly elliptical) with a strong apiculus. Context colored. Surface of most species laccate. (Cfr. also p. 99)....Ganodermus.
Spores colored, mostly globose, with none or a small apiculus. Context colored. Surface of most species dull. (See p. 99).........Amaurodermus.
Spores white. Context (except sec. 11) pale or white ....Lignosus.

Fleshy or Coriaceous.

Stipe lateral (Spores white) ....Petaloides.
Stipe branching and bearing several pileoli ....Merismus.

Stipe Central or Excentric (Rarely Lateral).

Flesh spongy, light (Spores white or colored) ....Spongiosus.
Spores colored. Fleshy or coriaceous ....Pelloporus.
Spores white. Fleshy, soft, usually terrestrial, with thick pilei ....Ovinus.
Spores white. Fleshy-pliant, coriaceus, usually thin pilei, and epixylous ....Lentus.
Lentus with black stems ....Melanopus.

SECTION FOMES (STIPITATE.)

Although the first sixty-one species placed in Fomes in Saccardo (Vol. 6) have stems, I believe there is but one of them that can be so included on the definition there given and generally accepted for this genus, viz.: "perennis, successive strata nova gerens." Many are subligneous in texture, but are annuals in temperate regions, and in the tropics if they persist more than one season (which is doubtful) they do not produce successive pore strata. The following is the only one in which I have noticed the slightest indication of strata.

DIABOLICUS (Fig. 397).—The entire plant (except the pores and context) is black. Stem mesopodal, with pale, solid context, and black, smooth, dull crust (1-1½ x 8-10 cm.). Pileus (8-14 cm.) black, even, depressed in the center, with black, smooth, dull surface. Context (5 mm.) pale cinnamon color. Pores minute, at first cinnamon, but black when old. If not in layers at least in distinct areas of growth. Colored setae very abundant on the hymenium. Spores not found, doubtless white. This is a rigid, black plant, growing on wood in Brazil. It is known only from Spruce's original collection. In its context color, setae, and spores (probably) it is related to Fomes pomaceus, but there is no other similar stipitate species known.

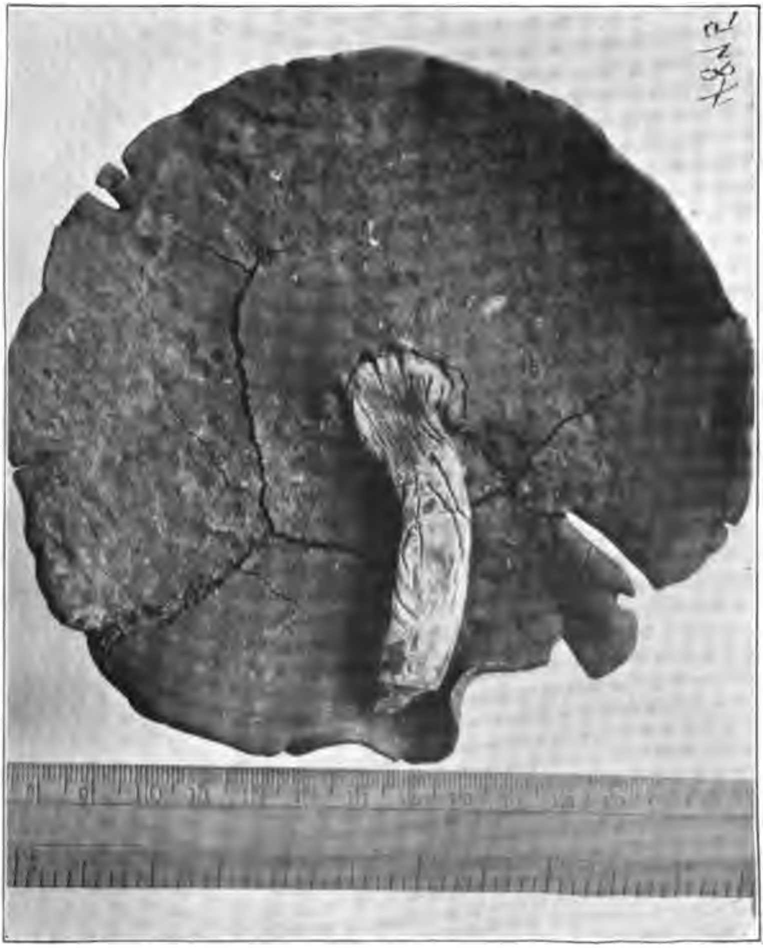

Fig 397

Fomes diabolicus.
(Reduced)

SECTION GANODERMUS.

The section Ganodermus is characterized by peculiar spores (see page 99) and also usually the stipe and pileus are laccate (viz.: covered with a dark, resinous, shining crust). The context and spores are colored.

2. SPORES SMOOTH OR BUT SLIGHTLY ROUGH.

LUCIDUS.—Stipe and pileus strongly laccate. Context cinnamon or fulvous, varying lighter. Pores not stratified. Spores 6 x 10, slightly rough. A strongly marked species of Europe and America and its forms (?) are found in the tropics. It is difficult to draw the line as to the tropical forms, although I am disposed to refer to lucidus all those with the same stem insertion and similar context color. The stipe is usually pleuropodal, rarely mesopodal, but the pileus is never in my opinion sessile. The three following I think are but forms of lucidus.

VALESIACUS.—Only a form with paler context, and not really a form at that, for lucidus varies much as to context color and is never very dark. The common American plant that corresponds to this European form has been called Ganodermus Thugae.

JAPONICUS.—Europeans usually refer the Japanese form to lucidus. In the Japanese lists it figures as Polyporus Japonicus. I think both are right. Forms that I have seen from Japan are blacker than the European plant but are surely the same species.

LAUTERBACHII.—A thin, tropical form of lucidus. It seems thinner and more rigid, but for me it is only a form.

OTHER FORMS.—Plants received from India I would refer to lucidus as forms. They are not so strongly laccate, more dull, and often mesopodal.

INCRUSTANS.—We have in the United States a curious form, or perhaps an abnormality, of lucidus which instead of taking the usual shape with a lateral stem is often thin, cup-shaped, with an indistinct stem. It has usually been referred to lucidus, but is quite different in its habits. It grows usually in grassy places, incrusting the blades of grass.

CURTISII.—Context, spores, and stipe as Polyporus lucidus, but not strongly laccate and color is yellowish. I have collections which are pale, almost white. It is a plant of a southern type in the United States, frequent in the South and extends up the coast to New Jersey and is rarely found in New England. In the museums of Europe there are several specimens exactly the same, from Africa.

AMBOINENSIS.—This is based on an old figure by Rumphius. Many specimens so named are in the museums, but I have seen but one that resembles the figure. This is a Philippine collection in the British Museum. The stem attachment is like that of fornicatus, but the stem is very slender and the plant appears to have grown erect as Rumphius shows it. The stem is not branched as originally shown, otherwise the specimen corresponds exactly. This was the first foreign species in this section to be illustrated. Fries referred to it pictures that appear quite different. The many specimens so named in the museums often have little resemblance to each other, or to the original picture.

COCHLEAR.—Plant with a black, laccate crust. Stipe thick (about an inch) 6-10 inches long, dorsally attached. Context cinnamon. Pores minute with white mouths. Spores 8 x 14, smooth or slightly rough. This is a common species in Java and the East Indies, but we have seen no specimen from any other section. There are a number of collections at Leiden, and it was sent to us abundantly by Dr. Konigsberger from Java. We take it in the sense of Bresadola's determination at Leiden, though we doubt if it is the same as Nees illustrated, especially as to the stipe. The plant has the same (*dorsal*) stem insertion as fornicatus and amboinensis, but much more obese stem.

AFRICANUS.—Pileus thick, obese, with a mesopodal, obese stem. Context dark, umber. Surface dull, resinous. Spores 7 x 10, minutely rough. In its relationship, color of context, and spores this plant is close to the sessile species such as applanatus and widely departs from all others in this stipitate section. The type came from South Africa and was misnamed Polyporus Umbraculum by Kalchbrenner and fragments were so distributed (de Thümen, 708). It seems to have the same color characters as fulvellus, which is a sessile species, and the exsiccatae number was cited under that species.

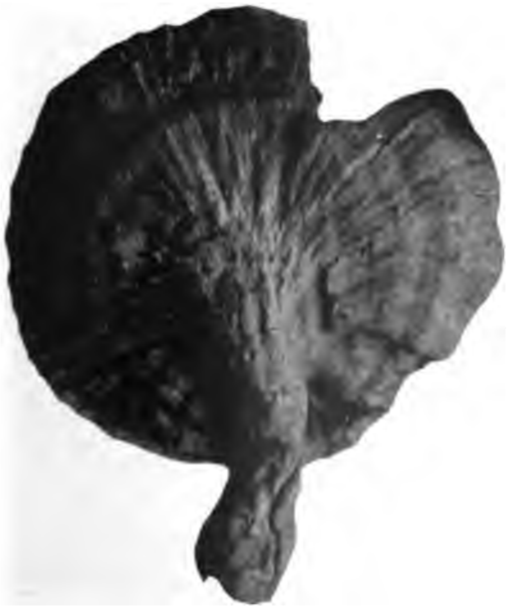

Fig. 398
Ganodermus fornicatus.

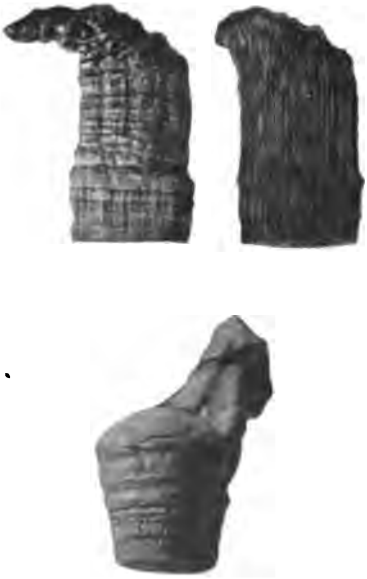

Fig. 399.
Ganodermus Lingua.

FORNICATUS (Fig. 398).—Pileus and stipe with black, laccate crust. Stipe slender, dorsally-lateral, attached. Context thin, cinnamon, fulvous. Pores *minute, hard, compact.* Mouths at first white (contrary to description), then *purplish* brown. Spores 6 x 10, smooth. No type exists, but it is frequent in Brazil, the "type locality," according to numerous collections of Spruce (No. 48, 79, 172). It is characterized by the peculiar stipe attachment. In Australia are similar plants, but the spores are rougher. There is also a similar plant common in Ceylon (teste Petch), but I have seen no specimens. Specimens from New Caledonia determined as amboinensis I take to be the same.

MASTOPORUS.—Stipe thick, lateral, with a smooth laccate crust. Context thin, cinnamon, scanty. Pores hard, *minute, compact,* dark purplish brown. Spores 5 x 8, smooth. Very similar to fornicatus as to the peculiar hard pores. Type from Singapore at Paris, but it comes to me frequently from Africa and is probably common throughout the East.

FLEXIPES (bis).—Pileus unilateral, attached, small (1-2 cm.) with a strongly laccate, black crust. Stipe slender, cylindrical, with a smooth strongly laccate, black crust. Pores small, pale cinnamon. Spores 5 x 10, smooth. Known from one collection, from China, in the herbarium of Patouillard. It differs from all others in this group in its slender stem and habits. It has a general resemblance (except small pores) to our figure (411) of Polyporus longipes.

LINGUA (Fig. 399).—Pileus small, rarely more than two or three cm. wide, but deep (2-3 cm.) in proportion to its width. Attached by a dorsal-lateral, short stem. Surface dark reddish brown, laccate, sulcate. Pores long, reaching the crust, small. Context cinnamon. Not common in the museums, but specimens seen from Java, Sumatra, and New Guinea. Known from its small size and peculiar shape. Type has not been seen. We take the species in the sense of Montagne's determination. It does not exactly correspond to the original illustration, but we have seen no specimen that does.

BONINENSIS.—Stipe dorsally prolonged. Surface dull, ferruginous or cinnamon, not laccate. Context dark tabacinus. Spores 6 x 12, smooth. Known only from the type at Paris from Bonin Island, collected by Wright and distributed (U. S. Expl. Exp.) as Polyporus lucidus. The corresponding collection at Kew is a different (laccate) plant.

REGULICOLOR.—Surface dull, reddish brown, not laccate. Stipe lateral, apparently proceeding from a rhizome or a rooting stem. Known from a single specimen at Kew stated to be from Cuba, but I think the locality is doubtful.

3. SPORES DISTINCTLY ROUGH.

OCHROLACCATUS (Fig. 400).—Pileus small but deep, attached by a short rudimentary, dorsal stem. Crust *pale, ochraceus,* faintly laccate, rugulose, zoned. Pores medium with white mouths, long, not stratified but reaching the crust, very regular, arranged in lines. Spores *large,* 16 x 32 (!), with small apiculus, distinctly rough. A strongly distinct species, very rare and known only from the Philippines. Types at Paris and at Kew and the British Museum. These collections which are surely the same species vary some in external appearance. The type at Paris is our figure 400. That at Kew is almost white with a dull surface. That in the British Museum is sessile and has a pale, smooth, shiny crust as if waxed but not laccate.

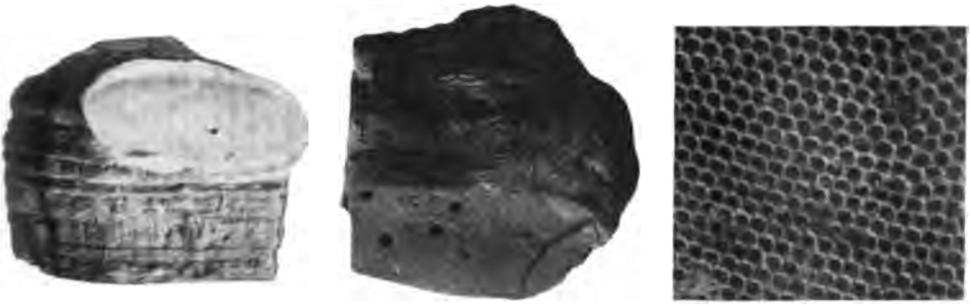

Fig. 400

Ganodermus ochrolaccatus (pores enlarged X6).

PLACOPUS.—Pileus with an intense *black, shining, laccate* surface, becoming dull in old specimens. Stipe lateral, with similar crust. A small species, thin, an inch or two in diameter. Spores 8 x 12, distinctly rough. Only known to me from Bresadola's naming from Java at Leiden. As I have found no types in any of the museums, I judge his determination was made from the description only.

EMINI (Fig. 402).—Pileus small, usually pleuropodal, rarely mesopodal. Stipe long, with black, strongly laccate, smooth crust, rooting at the base. Spores large with distinct apiculus 20 x 28, rough. The pileus is not as strongly laccate as the stipe. A marked species known from abundant types at Berlin from Africa.

HENNINGSII (Fig. 401).—Pileus and stem strongly laccate, smooth, dark. Pileus 3-4 inches in diameter with a mesopodal, rooting stem. Pores small, pale. Spores 10 x 12, rough, subglobose, but distinctly apiculate. Known from one collection at Berlin from Africa, made by Stuhlman and confused by Hennings with the preceding.

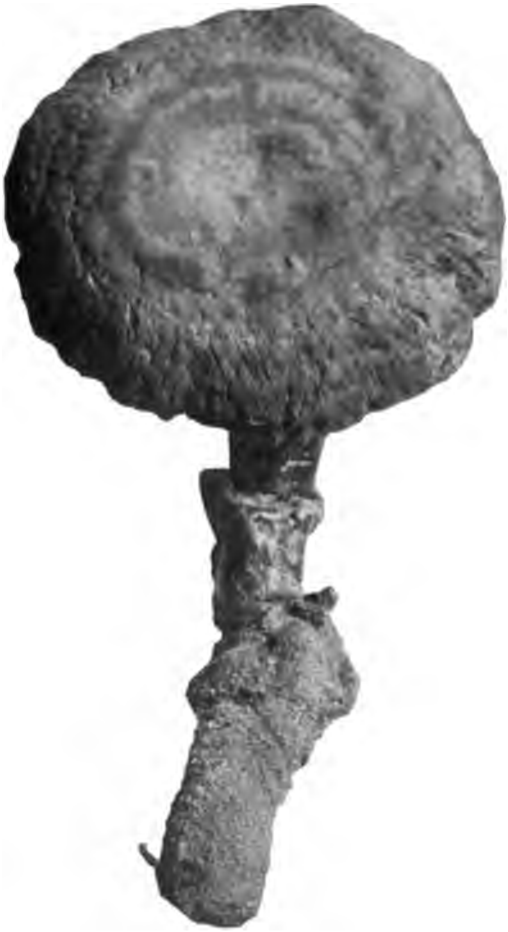

Fig. 401

Ganodermus Henningsii.

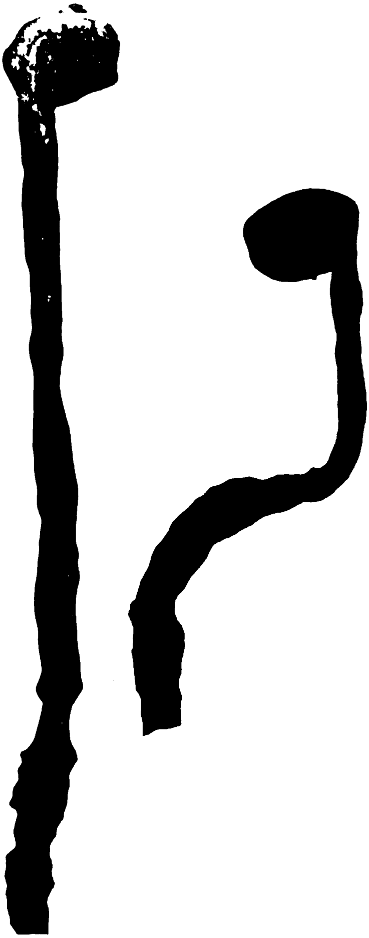

Fig. 402

Ganodermus Emini.

OPACUS.—Pileus 3-4 cm. x 5-10 mm. thick, with a fragile, dull, brownish crust. Stipe mesopodal with similar crust. Context *pale* cinnamon, thin. Pores minute with concolorous mouths, 4 mm. long. Spores 8-10 oval, with small, hyaline apiculus and are *strongly rough.* This is known from two collections at Paris, one from Brazil, the other from Cuba.

ALLUANDI.—Pileus with a smooth, black crust. Stem 1 cm. thick, 15 cm. long, laterally (dorsally) attached to the pileus, smooth, black crust. Pores small, round, some large and sinuate, with thin walls and concolorous mouths, long, reaching the crust. Context scanty, cinnamon. Spores 10 x 16-18 with a distinct apiculus and distinctly rough. Known from a single specimen at Paris (in the cupboard) from Africa.

UNNAMED.—Pileus with a thin crust, mat, minutely velvety, with a few darker, slightly metallic zones. Context very thin, pale cinnamon. Pores 1 cm. long, *minute,* pale cinnamon with concolorous mouths. Stipe mesopodal, 24 cm. long, sulcate, with sterile branches, covered with a smooth, black crust. Spores *strongly reticulate* (the only reticulate polyporoid spores known to me) obovate with small, apiculate base, 12 x 20, pale colored. Type found by me unnamed, without label, in a cupboard in the Museum at Paris, the origin unknown but probably from Africa. I do not name it as I presume they will wish to do so at Paris.

HILDEBRANDI.—Pileus, context, and stem exactly the same as the small form (ramosii) of Polyporus rugosus. Spores conidial, ovoid, 4-5 x 5-7, distinctly rough. Known from one specimen at Paris. I suspect it is a conidial form of Polyporus Ramosii.

4. ANOMALOUS SECTION WITH A FALSE STEM.

PISACHAPANI.—This is, I judge, an anomalous species. It is flat, branched like the fingers of a hand, and the stem is made of discs growing from each other, as if the plant started to produce a succession of pilei and then changed its mind and produced a false stem. The surface is smooth, laccate. Nees named and figured it from Java. I found a single specimen of this curious growth from Samoa. In my specimen the pores are not perfectly formed and I find no spores.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

I doubt if a more cumbersome, inaccurate, or impractical system could be devised for the naming of plants than the one that has been adopted by "Science" in the naming of fungi. The European work of Persoon and Fries was based for the most part on a practical knowledge that they had of the growing plants, and the greater part of their work was of the highest merit and will always stand. The only weak part is the species that were founded on old pictures, often inaccurate and erroneous, and the names were based often on the inaccuracies of the pictures. For many of them no plant is known that corresponds.

As to foreign (to Europe) species the whole subject has been a haphazard proceeding from the start. The earlier namers had very scanty material, but they based a "new species" on almost every collection that they received, and many of them were evidently but slight varieties or individual forms to which the same authors would have paid no attention had they seen the forms growing in their woods. As the years rolled by new "authorities" came into the field and each one has discovered a large part of the plants he got from foreign countries to be "new species" and gave them names, although not one of them, I think (except Bresadola), has made any serious endeavor to learn the names that others have given to largely the same plants.

The result is a mess of about 3,000 names of Polyporei mostly compiled into Saccardo to date, and no one can tell anything whatever as to their identity from what has been written about them. The only way to learn the names is to hunt them up in the museums where they are preserved, and when they are not preserved, and many of them are not, nothing will ever be known about them. This hunting up process is rather difficult and ordinarily is not possible.

Of the 3,000 "species" of Polyporei that have (mostly) been scraped up into Saccardo I doubt if one-fourth of them represent anything of value, and it is more trouble to learn which are of value than the subject is worth. If I had spent the same time and work on something useful, that I have working over these old puzzles, I do not doubt that a great deal more good could have been accomplished. But with me it has been a recreation and a pleasure that the subject would probably not have yielded had it been exploited in an intelligent manner, and had anything definite been known about it.

There are about 700 alleged species (names) that are supposed to be stipitate and considered in this pamphlet. Of these I have seen about 500 authentic specimens, and of those seen 225 impress me as being good species and having merit and 58 others have been retained as having some possible value. The others I have seen to the number of about 215 chiefly reflect I believe the lack of knowledge or judgment on the part of the authors. In addition there are 65 stipitate species (dead) carried in our literature of which no authentic material can be found. Nothing will ever be really known about any of them, though it is the fashion nowadays for tourists to make running visits to the various museums and come home and tell just as big yarns about those that do not exist as they tell about those that do. As long as they can arrange a lot of Latin names in a row and give the dates, it seems to be immaterial whether there is any truth in the arrangement or not. There are 105 alleged species marked in this pamphlet unknown (to me) that do not exist in any of the principal museums. They may be found in some out of the way museum or private collection, though I doubt if they are worth the trouble to look them up. Still I presume they have the same possible value as those that are in the museums as they are all a very uncertain quantity.

The species of fungi are relatively few and widely distributed, a fact that is becoming more firmly fixed every day. What constitutes a species, however, can not be defined by words. It is only a matter of experience and individual opinions. The question of variation which is a large factor in the truth of the problem is hardly taken into account at all by the promoters of "new species." And it is a question of course in which there is room for many differences of opinion.

In the following lists of synonyms we have given our opinions of the specimens we have seen. We do not do it with the idea that it will settle the questions in any way, for that is impossible. "Science" nowadays consists in raking over these old "synonyms" and arranging them chronologically, and we suppose this process will be continued to the end of time. A "new species" is like a spot of ink. It may not have the slightest merit or value, and may be based solely on the fact that its author was not informed on his subject, but there is no way to ever get rid of it.

albo-cinctus, Congo, Patouillard. Unknown to me. Seems to have the stipe attachment of fornicatus.

argillaceus, Cuba, Murrill. Unknown.

asperulatus, Philippines, Murrill. Unknown.

avellaneus, Central America, Murrill. Unknown.

coffeatus, West Indies, Berkeley. Type is a few fragments from which nothing can be learned.

Currani, Philippines, Murrill. Unknown.

declivis, Pacific Island, Kalchbrenner. Unknown to me, but the description reads like fornicatus.

flaviporus, West Indies, Murrill. Unknown.

formosissimus, South America, Spegazzini. Only known to me from Rick's determination, which (teste Bresadola) is the same as renidens.

Haenslerianus, New Zealand, Hennings. No specimen found by me at Berlin.

incrustatus, Central America, Fries. No type exists.

Javanicus Java, Léveillé. Type at Leiden in very bad condition, but I think belongs to the section Ganodermus and has no relation whatever to Polyporus varius, of which it was given as a "variety" by Léveillé.

neglectus, Central America, Patouillard. Type is a mere fragment from which little can be told. The species was based on large, globose spores, which are not the normal spores of the plant. The basidial spores are typically those of the section Ganodermus (not Amaurodermus, as named).

nutans, Central America, Fries. No type exists and its identity is unknown. The determinations at Paris, Berlin, and London are all different from each other and all are probably wrong. Murrill's elaborate account was only worked up from Fries. He tells "spores not examined," which was not strange as he never saw an authentic specimen, and I do not see how he could have examined the spores of a specimen he never saw.

perzonatus, Cuba, Murrill. Unknown.

Pes-simiae, Brazil, Berkeley. No type exists. From the description it seems to be Pisachapani.

praelongus, Cuba, Murrill. Unknown.

pulverulentus, West Indies, Murrill. Unknown.

stipitatus, Central America, Murrill. Unknown.

subamboinensis, Brazil, Hennings. Same as Lauterbachii, and both are but tropical forms of lucidus.

subfornicatus, Central America, Murrill. Unknown.

subincrustatus, West Indies, Murrill. Unknown.

Tsugae, United States, Murrill. Same as the common Polyporus lucidus of Europe, the distinction given being that it has paler context and that Polyporus lucidus has "one to many-layered strata varying in distinctness," all of which was chiefly imagination on the part of the author. Polyporus lucidus is an annual and never has strata of pores, though as it has been called "Fomes" Mr. Murrill was undoubtedly right in thinking if it did not have strata it ought to have. As to the paler context the same form had been named Valesiacus in Europe, but it is not even a distinct form of lucidus.

SECTION AMAURODERMUS.

The section Amaurodermus is quite close to the preceding section, but is distinguished by large, globose, oval, colored spores, which usually have no distinct apiculus. All are stipitate plants with usually dull (not laccate) surface and often velutinate stems. Species rarely have smooth, laccate stems. Context and hyphae are colored. All are plants of the warm countries, no species being known in temperate regions. (Cfr. also p. 99).

5. POLYPORUS. SPORES SMOOTH OR BUT SLIGHTLY ROUGH. STEM SLENDER, USUALLY MESOPODAL.

RUGOSUS.—Pileus dark brown, rugulose with a dull, mat surface. Stem olive brown with a dull, minutely velutinate surface. Context pale cinnamon, when freshly cut it turns reddish. Pores small with thin walls. Spores globose, smooth, 6-8 or 8-10. This is quite a common species in the East and numerous specimens from Java and Ceylon are at Kew. I have not seen the type but Nees gave a good figure of it, and specimens from Ceylon (Thwaite, No. 728) exactly

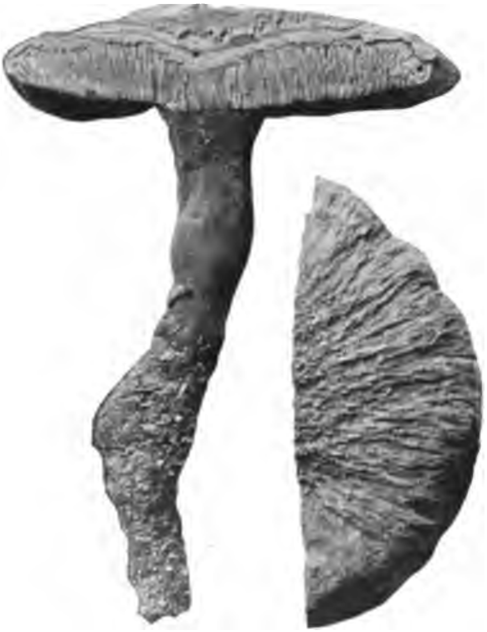

Fig. 403

Amaurodermus rudis

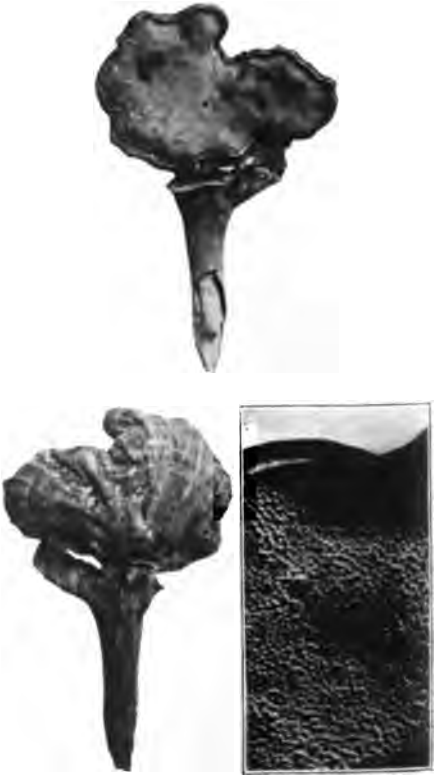

Fig. 404

Amaurodermus Sprucei with enlargement of pore mouths.

accord with this figure. The fresh plant when bruised turns dark and herbarium specimens are usually black.

RAMOSII.—Bresadola endorses this as a synonym for rugosus, and I think it is a slender form. The spores and other characters are in the main the same, but the plants are more slender and the context thinner. It occurs over the same regions as rugosus and also the Philippines.

RUDIS (Fig. 403).—Pileus strongly rugulose with mat, dull surface, minutely velutinate, light in color. Stems with olive, velutinate surface. Pores medium, with thin walls. Context light cinnamon. Spores globose, 9-12, with thick walls, minutely rough. The type of rudis I have not found, but there are abundant collections so named by Berkeley from Australia, where it seems to be common. It is close (too close perhaps) to rugosus of the East, but seems to be more rugulose, has larger pores and spores, and when mature retains its color. Young specimens, however, turn black in drying.

SPRUCEI (Fig. 404).—(Change of Porothelium rugosum of Berkeley.) Pileus dark brown, rugulose, with narrow, concentric zones. Surface mat. Stipe pleuropodal with mat surface, concolorous. Pores and context pale, the pore mouths pustular, hence put in the genus Porothelium (sic) when originally named. Spores globose, 8 mic., smooth, very pale. Known only from the (abundant) types collected by Spruce in Brazil. It departs from others of this section in its spores and context being paler.

VARIABILIS (Fig. 405).—Pileus from 2 to 6 cm. broad and about 5 mm. thick, with a lateral, slender stipe. Color pale alutaceous, both pileus and context. Surface dull. Spores 9 x 12, oval, smooth. This is quite a distinct species, characterized by its pale color and oval spores. It is known from two collections (Nos. 57 and 183 part) made by Spruce in Brazil. It is badly named for it is quite uniform, but there was confused (and figured) with it quite a different plant (cfr. Polyporus unilaterus, in the next section).

CALCIGENUS.—Pileus about an inch in diameter, with a reddish brown, laccate crust. Context pale olive. Stem mesopodal, slender, with brown, mat surface. Spores abundant, oval, large, 12 x 16, deeply colored, smooth. Quite distinct but known from a single specimen at Kew from Spruce, Brazil.

RIVULOSUS.—Pileus glabrous, rugulose (not rivulose, I think), reddish brown with paler margin. Stem pleuropodal, branched, sometimes bearing two pilei, with a smooth, dark reddish crust. Context thin, ligneous, pale cinnamon. Pores minute, pale but darker than the context. Spores globose, 14 mic. faintly reticulate, with thick walls. Known only from the type in the Museum at Paris from Java. It has the general appearance of a Ganodermus, but from its spore characters belongs to Amaurodermus.

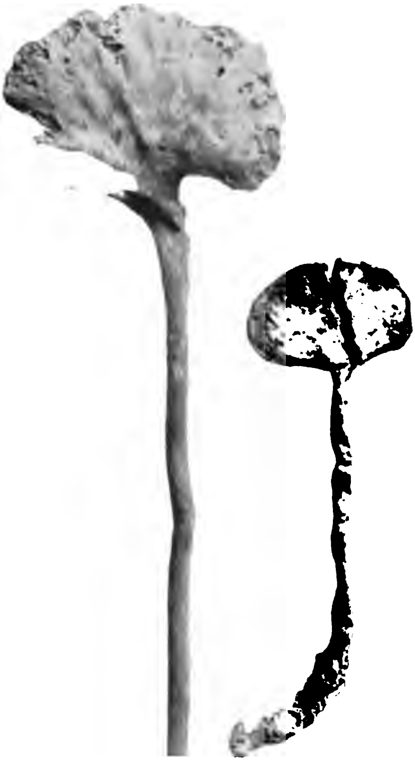

Fig. 405

Amaurodermus variabilis.

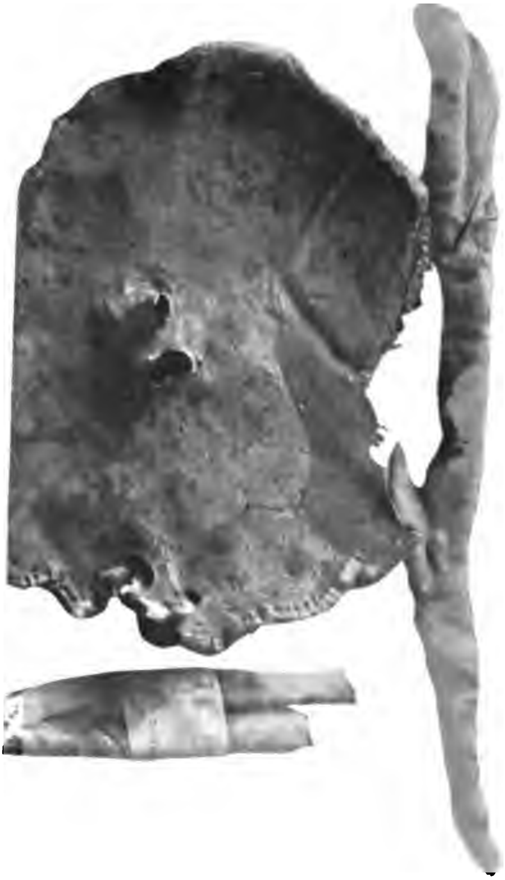

Fig. 406

Amaurodermus Chaperi.
Reduced one-half.

CHAPERI (Fig. 406).—Pileus 15 cm. broad, with a smooth, dark crust, but not laccate. Stem hollow, with sterile branches, with smooth, pale grayish surface. Pores minute, short with dark mouths. Spores globose, smooth, or minutely punctate, 8-12. Known from a single and quite old specimen in a cupboard at Paris. It was first referred (through error) to Polyporus scleropodius of Africa, then described and named as above.

INTERMEDIUS.—Pileus soft, velutinate (now wrinkled) black. Stipe mesopodal with a hard, black, smooth, laccate crust. Spores abundant, globose, smooth, apiculate, 12 mic. Known from a single specimen kept in a drawer at Berlin, from Africa. It was originally sent in glycerin and is still soft and sticky.

SECTION AMAURODERMUS.

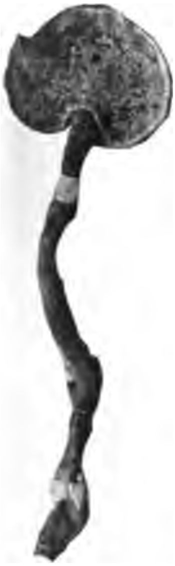

Fig 407

Amaurodermus Auriscalpium.

Fig 408

Amaurodermus praetervisus.

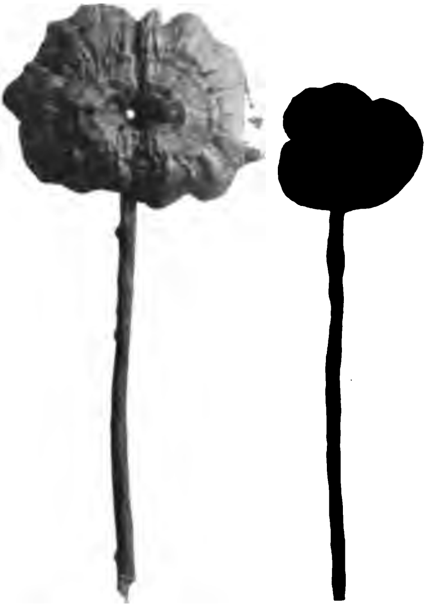

Fig. 409

Amaurodermus omphalodes.

AURISCALPIUM (Fig. 407).—Pileus reniform, the upper surface rugulose, zonate, mat. Stipe lateral with a dull crust. Color reddish brown. Spores 6-8, globose, smooth, pale colored. The original Persoonian specimen from Brazil is still well preserved at Paris. Montagne referred here several collections from South America which Berkeley and Patouillard have held to be different.

PRAETERVISUS (Fig. 408).—This is based on a single specimen from Brazil, referred to the preceding by Montagne. As to shape, size, context, color, and spores it is very much the same, but it has larger pores and a thicker, blacker, harder crust.

OMPHALODES (Fig. 409).—Pileus orbicular, with a mesopodal stem, but rarely perfect, being usually more or less lobed and divided to the stem. Surface glabrous but not laccate, rugulose, more or less zoned. Stipe slender with a mat, dull surface. Pores small, 2 mm. deep. Spores globose, 12 mic., smooth, pale. Abundant specimens were sent to Kew from Spruce, Brazil. All have very much the same general size and stature as our figure. At Paris are much larger, obese (but otherwise apparently the same) specimens from South America, called "var. fulvaster."

6. POLYPORUS. SPORES DISTINCTLY ROUGH. STEM SLENDER, USUALLY MESOPODAL.

a. STIPE SMOOTH, NOT LACCATE SURFACE.

ANGUSTUS (Fig. 410).—Pileus large (10 inches in diameter) with glabrous, strongly rugulose, zoned, dull, grayish brown, not laccate, crust. Stipe mesopodal, an inch thick, with spongy context and hard, smooth, gray, not laccate crust. Pores minute, soft, *pale isabel-*

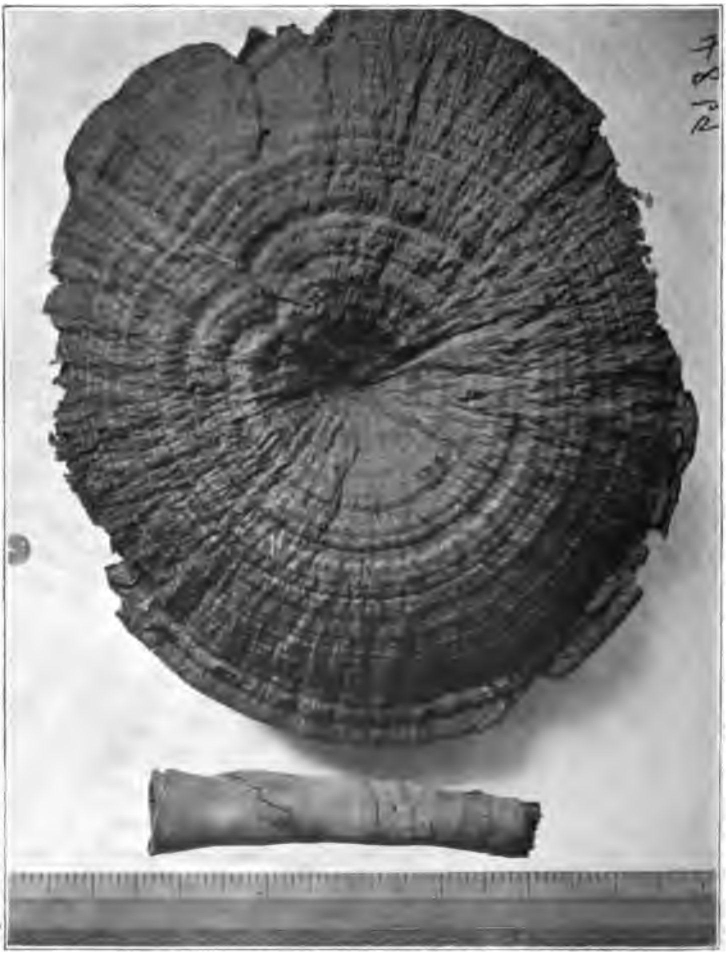

Fig. 410

Amaurodermus angustus. (Reduced more than one-half).

line, as is the context. Spores (only conidial, I think) globose, colored, strongly tubercular, rough, 8 mic. A remarkable species known from one specimen at Kew collected by Spruce in Brazil. It is the largest, mesopodal polyporoid I have noted and grew on wood. I suspect that its normal spores would be found to be quite different, and that the plant is not well classed in this section. No other plant in this section, I believe, grows on wood, and most of them have subterranean rhizomes.

b. STIPE WITH A SMOOTH, LACCATE CRUST.

LEPTOPUS.—Pileus 5 cm. broad, 1½ cm. thick, with a dark, smooth crust. Stem, almost gone now, but enough remains to show that it was mesopodal, about 12 cm. long, one cm. thick, and had a dark, smooth, shiny, laccate crust. Context pale cinnamon. Pores small, about one cm. long, pale cinnamon. Spores globose, 12 mic., strongly rough. The species was referred by Fries, who never saw it, to umbraculus, of which no type exists, and I think there are no grounds for accepting the reference. It was so accepted by Patouillard, however, who drew his characters from Persoon's specimens and knew nothing whatever about Fries' plant. The species is only known from the original, Persoonian specimen, preserved at Paris. It was from the island of Rawak.

LONGIPES (Fig. 411).—Pileus unilateral, attached, with a reddish brown crust which is not polished (laccate) as the stipe. Stipe slender, with a black, shiny, laccate crust. Pores large, *pale* cinnamon, reaching the crust. Spores unique, globose, 12-14 mic., strongly rough, having the ***asperities arranged in distinct bands or areas.*** This is a very peculiar species, known only from one quite abundant collection from French Guiana. Collector unknown. Leprieur, who made large collections from the same locality, never found it.

RENIDENS.—Pileus dull reddish brown. Stipe lateral, smooth, laccate crust. Context scanty, cinnamon. Pores and pore mouths concolorous. Spores globose, 8-9, rough. Known to me only from the type at Berlin, from Brazil, collected by Moeller. (Plants distributed by Rick as formosissimus are said to be the same. I have not examined their spores.) Except as to the spores this species has the general appearance and character of Polyporus lucidus.

BASILAPIDOIDES (as Laccocephalum).—Pileus brownish fawn, with strongly pitted surface. Context whitish. Stem short, thick, mesopodal, forming at the base a large, hard, false sclerotium, consisting of agglutinated grains of sand fixed by the mycelium. Spores globose, orange yellow, echinulate, "44-50 in." (mic.?) in diameter. This Australian species, called the "stone making fungus," is only known in Europe from the description and figures in an Australian publication. It was proposed as a "new genus," but I judge from its spore characters it should be classed here.

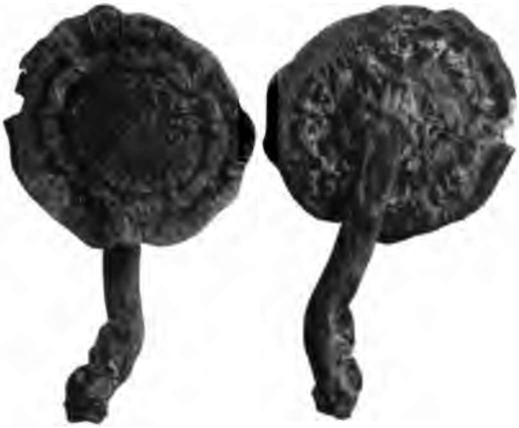

Fig. 412
Amaurodermus insularis.

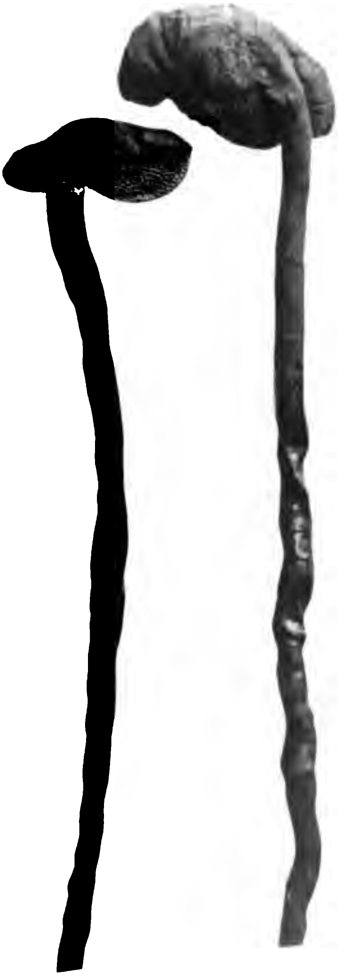

Fig. 411
Amaurodermus longipes.

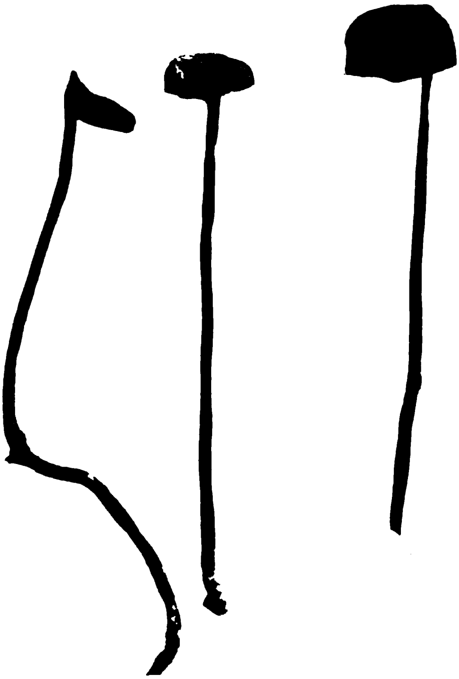

Fig. 413
Amaurodermus unilaterus.

c. STIPE WITH DULL, MINUTELY VELUTINATE SURFACE.

UNILATERUS (Fig. 413).—Pileus small (1-1½ cm.) reddish brown, dull surface, unilaterally attached. Stem slender (1½-2 mm. x 7-9 cm.) with dull surface. Pores minute, 5-8 mm. deep, pale cinnamon with white mouths. Spores large, globose (or subglobose) 20 mic., distinctly rough. The types at Kew (Spruce, No. 207) from Brazil were named by Berkeley in manuscript "ellipticus," but when published they were included and figured as part of Polyporus variabilis. They differ from variabilis not only in different stem insertion but have very different spores.

FASCICULATUS.—Pileus unicolorous, pale fauve in some specimens, fuliginous in others, marked with prominent, raised, narrow, concentric zones. Context cinnamon. Stem with dull, velutinate surface, light brown color. Pores minute, 3-4 mm. deep, darker color than the context, the mouths stuffed, isabelline. Spores subglobose, 12-14, strongly rough, pale colored. A strongly marked species known only from two collections, both from Congo, Africa. The original is in the herbarium of Patouillard at Paris, others sent me by Edouard Luja, Congo Belge. A character of both of these collections is that each pileus is borne on two or more distinct stems, or perhaps the pilei of two or more stems are consolidated into one, but they do not seem to have that appearance.

INSULARIS (Fig. 412).—Pileus 3 cm. with a strongly wrinkled, dull, mat surface. Pores large, pale cinnamon, in the "type" mostly torn and destroyed. Stipe mesopodal with mat, finely velutinate surface. Spores large, oval, 12 x 16, minutely but distinctly rough. Known from a single specimen at Paris from New Caledonia.

7. POLYSTICTUS, PLANTS WITH THIN PILEI AND PORE LAYERS.

Spores of some species said to be globose, colored, but I have rarely found them, and hence can not state from my own knowledge. Context and pores colored, brown. Hyphae colored. I suspect some at least have hyaline spores.

a. PORES LARGE.

GRACILIS (Fig. 414).—Pileus lateral (or unilateral) thin, dark reddish brown, with dull surface. Stipe slender (1-2 mm. thick by 5-15 cm. long) with a dull surface, proceeding from a rhizome or buried rootstalk. Pores *large*, 1 mm. in diameter, round or hexagonal. Spores not found by me. This is a unique species only known from the original collection, Spruce, Brazil. It was classed by Berkeley in the genus Hexagona where it really belongs on its pore characters alone. However, there is no other similar species in the genus Hexagona, and in its habits, context, surface, also spores probably, it is evidently so close to this section Amaurodermus that it should be placed here.

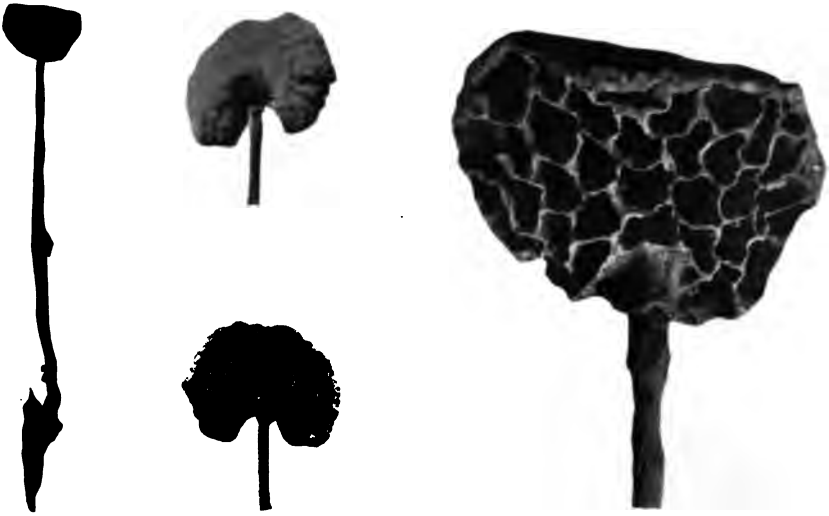

Fig. 414

Amaurodermus gracilis. (One specimen exlarged X6).

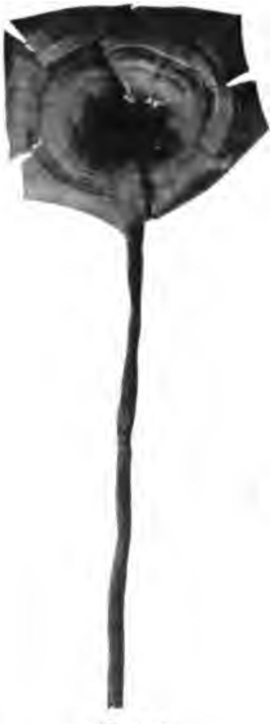

Fig. 415

Amaurodermus ocellatus.

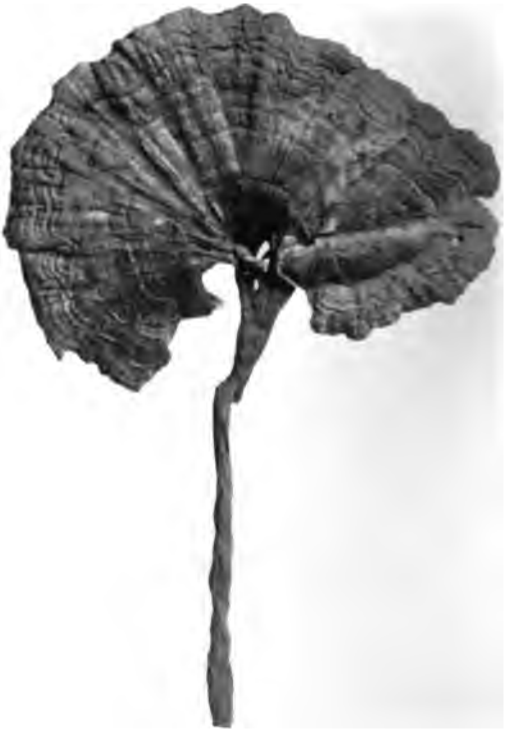

Fig. 416

Amaurodermus Schomburghii

b. PORES SMALL.

OCELLATUS (Fig. 415).—Pileus thin but *rigid.* Surface smooth, faintly zoned. Pores very minute, rigid with thick walls. The colored hyphae have thick walls so that a cross section appears like thickened cells. Stipe central or lateral, slender, mat, light brown. Spores not found. Known only from Brazil collections (Spruce). The pores are so minute that they are hardly visible, but it is all a mistake that "the pore mouths are contracted, etc."

MACER.—I did not cut the single specimen that represents it (Spruce, Brazil) but as to the pileus and pores it seems to me the same as the preceding. The lateral stem, however, is blacker and I think it a different species. The determinations, "macer, Berkeley," both at Berlin and Paris have no resemblance to it.

SCHOMBURGKII (Fig. 416).—Pileus mesopodal or pleuropodal, thin with zonate, smooth surface. Pores concolorous, minute. Stipe dull, slender. Named from specimens from British Guiana in Hooker's herbarium, but afterwards found by Spruce in Brazil.

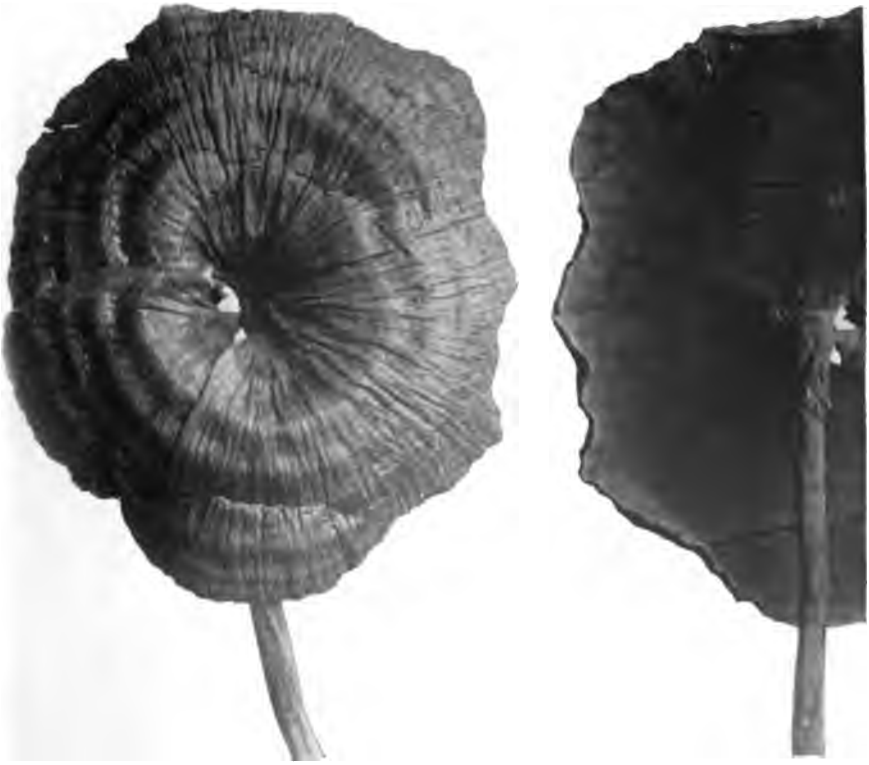

Fig 417
Amaurodermus sericatus.

SERICATUS (Fig. 417).—Pileus thin, seal-brown, depressed in the center, coriaceous, with a smooth, minutely velvety, shiny, satiny surface. Stipe mesopodal, long (15-20 cm.), slender (3-5 mm. thick) with dark, dull velvety surface. Pores minute (1-1½ mm. deep) clear seal-brown, with concolorous mouths. Hyphae deeply colored. Setae none. Spores not found, probably white. A single specimen is at Kew, collected by J. H. Holland at Old Calabar, Africa, and referred by error to rugosus.

HETEROMORPHUS.—Pileus depressed in the center, brown, sub-zonate. Pores with white mouths, at least when young. Stipe mesopodal, with dull surface. The types both at Paris and at Kew are young collections. Several specimens in the museums I think are referred here in error.

RENATUS.—Pileus thin, reniform, with a lateral stipe, dark reddish brown. Pores minute, white then brown. Stipe slender (1½-2 mm.) with dull surface. Known from Spruce's collection in Brazil. Ellis also determined it from Nicaragua and I think correctly. It seems to me very close to the next, but is larger and pleuropodal.

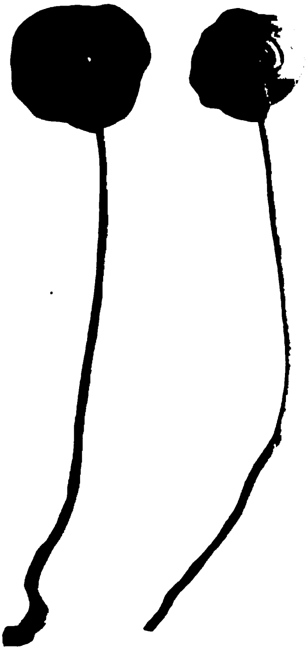

Fig. 418

Amaurodermus exilis.

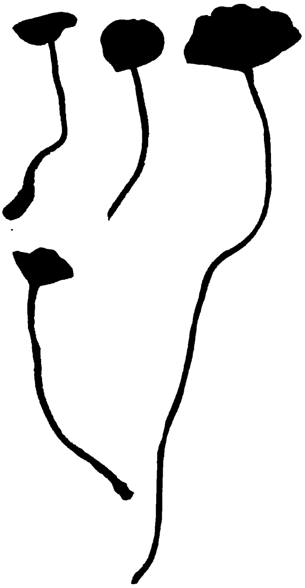

Fig. 419

Amaurodermus marasmioides.

JURIENSIS.—Pileus thin, rigid with a minutely velutinate, rugulose, dark, zonate pileus. Pores minute, white, bruising brownish. Stipe mesopodal, slender with dark, dull, velutinate surface. Spores globose, pale colored, 3½-4 mic. Collected in Brazil and called Polystictus sacer var. juriensis by Hennings. It has no resemblance or remote relationship even to Polyporus sacer.

EXILIS (Fig. 418).—Pileus thin, mostly mesopodal, with smooth, faintly zonate surface, small, 1-1½ cm. Pores minute. Stipe filiform (1 mm. thick) long, wiry. Known from Spruce's collections from Brazil. Placed in Fomes (sic) by Cooke.

MARASMIOIDES (Fig. 419).—The smallest species in this section, but with the exception of size it has the same characters as exilis, and I think is only a small Polyporus exilis. The specimens sent to Paris by Berkeley have a little filiform stem, not over 2 cm. long, with pilei about ½ a cm.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

auriscalpioides, Brazil, Hennings=auriscalpium.

bataanensis, Philippines, Murrill. Unknown.

boleticus (Bull. Soc. Myc.) misprint for boleticeps.

Boleticeps, South America, Patouillard. Unknown to me except from illustration (Bull. Soc. Myc. France, 1888, pl. 12). Seems close to omphalodes and came from same region.

cassiaecolor, Brazil, Berkeley. A single specimen so named which, though thick, I believe to be a thick specimen of Schomburgkii.

Clemensiae, Philippines, Murrill. Unknown.

Elmerianus, Philippines, Murrill. Unknown.

nigripes, Brazil, Fries. No type exists. Unknown. The description reads much like leptopus.

Pala, South America, Léveillé. Unknown. No type exists.

Parmula, Brazil, Berkeley=exilis.

passerinus, Brazil, Berkeley=renatus.

procerus, Brazil, Berkeley. Only two specimens so named, both immature. One specimen has quite a long stipe. I think both are heteromorphus.

pulcher, Africa, Fries. No type exists. Figure (Afz. 19) seems to be in this section although it has a laccate stipe.

pullatus, China, Cooke. This is a manuscript name that Berkeley gave to an old specimen from Hong Kong, but afterward concluded that it was rudis of Australia and did not publish it. Cooke afterward dug it up and published it. I do not think the old specimen is rudis, but it was too poor to publish.

rufobadius, South America, Patouillard. Unknown to me except from illustration (Bull. Soc. Myc. France, 1889, pl. 10). Seems to me to be too close to omphalodes.

rugosus, Berkeley, Brazil (as Porothelium). The specific name being a duplicate, was changed to Spraguei.

subrenatus, Central America, Murrill. Unknown.

subrugosus, Samoa, Bresadola=rugosus.

Umbraculum, Africa, Fries. No type exists. Unknown. Used by Patouillard as a substitute for leptopus of Persoon which was not justifiable as he knew what leptopus was and did not know as to Umbraculum. Specimen determined by Kalchbrenner and distributed (de Thümen 708) has no possible resemblance to Fries' description or the figure cited.

xylodes, Brazil, Berkeley=Schomburgkii.

SECTION LIGNOSUS.

This section embraces stipitate species, that are subligneous but not perennial. In texture they are similar to the preceding. They are never soft and fleshy. The hyphae and spores are pale, in which characters they differ from the two preceding sections. Most of them are included in Fomes in Saccardo, but none of them are Fomes according to the definition of the genus that Saccardo gives.

8. PLANTS WHICH FORM A SCLEROTIUM. CONTEXT PALE OR ISABELLINE. SPORES PROBABLY WHITE.

SACER (Fig. 420).—Pileus thin, with minutely velutinate, zonate surface. Color pale to dark brown. Stipe mesopodal, dull, pale surface, proceeding from an underground sclerotium. Context and pores isabelline. Pores medium small with thin walls. Polyporus sacer is represented in the museums by a number of collections, all from Africa. It first reached Fries and was of much interest from the fact of having a sclerotium. The name "sacer" refers to some superstition that the negroes are said to attach to it.

RHINOCEROTIS.—Pileus glabrous, rugulose zoned, at first thin, then thicker and indurated. Stipe mesopodal with a dull surface, not "laccate" as erroneously described, proceeding from a sclerotium two or three inches in diameter. Context pale. Pores *minute*. This plant is so close to Polyporus sacer that our photograph (Fig. 420) could well represent either. It is quite different however in its *minute* pores, and the tissue of old specimens becomes more thick, hard, and woody. It was known for many years only from the imperfect type from Malay, but recently a fine specimen was sent to Kew from Perak, and Professor Petch has made one collection in Ceylon.

9. PILEI UNILATERAL AND SUPERIMPOSED. CONTEXT PALE.

SUPERPOSITUS (Fig. 421).—Pileus unilateral and superimposed, arranged one above the other or on one side of stem, like shelves. Surface pale isabelline, smooth. Context pale isabelline. Hyphae pale. Spores not found, doubtless white. This species is most curious in the peculiar arrangement of the pilei. It is known from three collections, all at Kew. First it reached Berkeley from "New England," Australia (not "Amer. Bor." as Saccardo incorrectly compiles it) then Cooke got a collection from Perak and one from New Guinea. These three from widely remote localities are all I have seen of this most peculiar species.

10. STIPE MESOPODAL OR PLEUROPODAL. CONTEXT WHITE OR PALE. SPORES WHITE.

CORRUGIS (Fig. 423).—Pileus with pleuropodal (rarely mesopodal) stipe. Surface of pileus and stipe minutely velvety-brown with

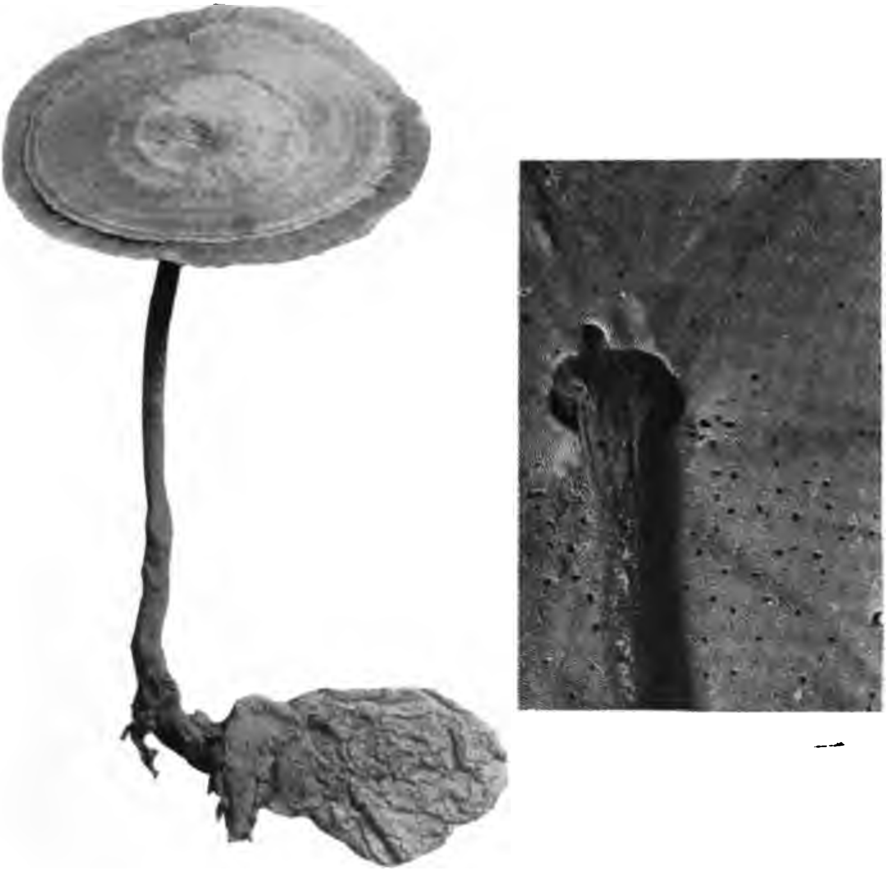

Fig. 420

Lignosus sacer, the plant (reduced) and pore surface (natural size).

faint, metallic zones. Context white. Pores medium, firm. This is a rare species of Europe known only from the Alps and rare there. I have seen but three collections. First, at Berlin, collected by Morthier at Neuchatel and determined as "triqueter, Fr." Second, sent to me by Dr. Butignot, Switzerland, and third, in the herbarium of Boudier, also from Dr. Butignot (and labeled Trametes Butignotii, not published?). In its context, color, and pores it closely resembles Polyporus benzoinus (a sessile species). It was named Polyporus rugosus by Trog, then changed to Polyporus Trogii by Fries (Cfr. Sacc. 6, 82) but when Fries published it, Hym. Eur. p. 536, he called it Polyporus corrugis. No type exists in Fries' herbarium, nor I am told in that of Trog.

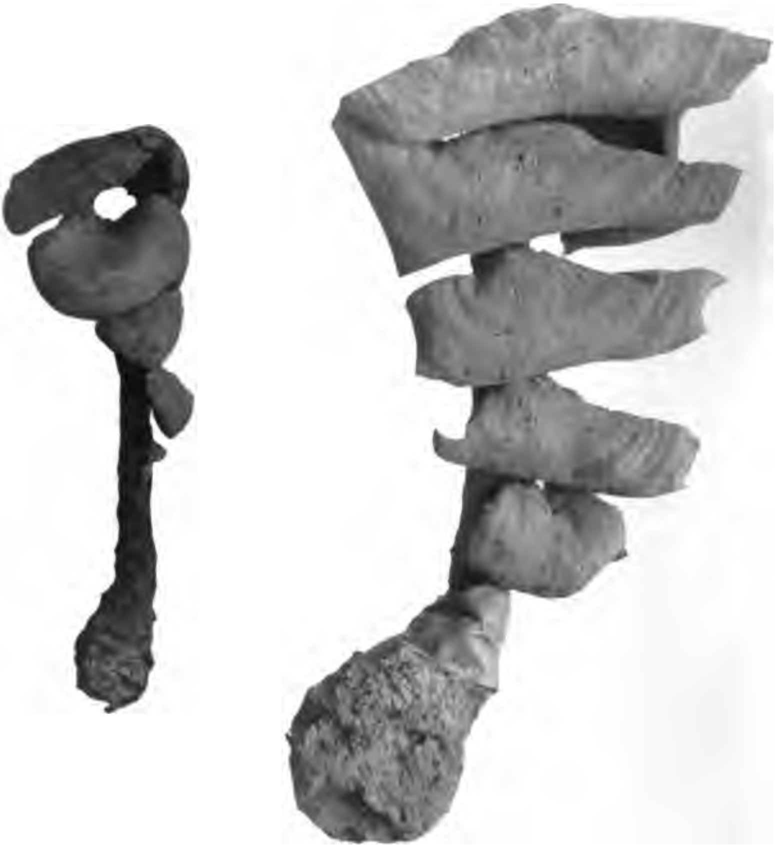

Fig 421

Lignosus superpositus.

PREUSSII.—Pileus with a dark, nearly black, rugulose surface. Stipe mesopodal. Context and pores pale isabelline, rigid. Pores minute. Spores not found, but I think are white. Known from one specimen at Berlin from Africa. The photograph would closely resemble Polyporus rugosus, but the plant is quite different. It is close to the preceding if not the same. It was named by Hennings as Ganodermus, but does not belong to that section though it might be called a Trametes.

DEALBATUS (Fig. 422).—Pileus lateral or unilateral with a stem 3-8 mm. thick. Surface pale, smooth, dull with a minutely velutinate coat (compared in its naming to a coat of whitewash). Context pale. Spores globose or compressed-globose, 5-6, smooth. This

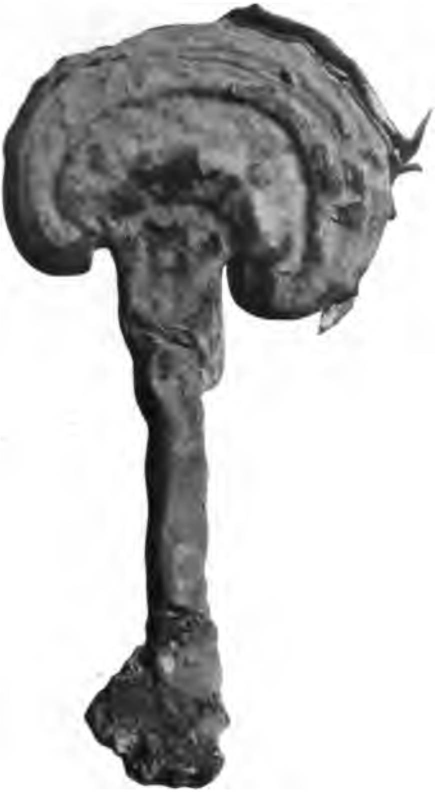

Fig. 422
Lignosus dealbatus.

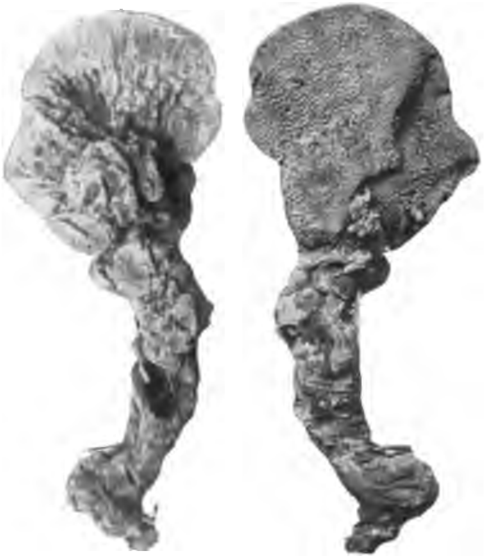

Fig. 423
Lignosus corrugis.

species has been badly confused (see page 190). It was originally collected by Ravenel in South Carolina and Curtis also found it in North Carolina, but I think no specimens exist except these original types. It is found in Saccardo (page 159) as Fomes and also (page 218) as Polystictus, and it is neither.

PANSUS.—Pileus rugulose, with a dull surface, strongly zoned with brown and darker zones. Stipe mesopodal with a mat, dull surface. Context thin, almost none, pale. Pores minute, 1½-2 mm. long, isabelline color which may be due to age, as it is described as white. Spores abundant, globose, 8 mic., pale colored, which may also be due to age. This is a strongly marked species of which several specimens have reached Kew from northern South America.

DUBIOPANSUS.—This has all the characters of the preceding except that the pores have *orange mouths*. This is quite uniform and appears to me a natural color. I am told that it is caused by a Hypomyces, but I am unable to detect the mycelial threads of a parasite in the tissue and it does not seem to explain it to me. The spores which I think are conidial are subglobose, hyaline, apiculate, and distinctly rough. I have a specimen from L. Damazio, Brazil, and there is one at Kew from Georgetown, British Guiana.

PAULENSIS.—Known by a single specimen from Brazil at Berlin. If not the same it is quite close to pansus. It has a well developed, ligneous, white context and *hyaline* globose, 6-7, smooth spores. Otherwise it seems the same as pansus, particularly in its peculiar, zoned surface.

HYPOPLASTUS.—Surface dark, almost black, faintly zonate. Stipe black, smooth, with a resinous crust. Context pale isabelline. Spores not found, but I think they are white. The type is a mesopodal plant, but Berkeley refers here (and I think correctly) two flabelliform specimens. All are from northern South America. This plant differs from all others in this section in its laccate stem. While I have found no spores, I believe it does not belong to the section Ganodermus.

CAMERARIUS.—Pileus reniform, smooth, even, glabrous, beautifully zoned with narrow, regular, concentric, brown zones. Stipe is pleuropodal (in one specimen, probably the same, it is mesopodal) with a dull crust. Context pale isabelline, probably white when fresh, 2-3 mm. deep, almost reaching the crust. Spores not found, probably white. Several specimens of this are at Kew, all from northern South America.

ARENATUS.—Pileus flabelliform, subligneous, incurved in drying. Surface gray, strongly zoned. Context white. Stipe lateral, short, thick. Pores minute, rigid, pale. A strongly marked species from New Guinea found in the Museum at Paris.

RHIZOMATOPHORUS.—Pileus flabelliform, thin, with smooth, pale isabelline surface. Pores minute, concolorous. Stipe slender, long, attached to a slender, long rhizome. A single specimen of this is at Berlin, from Brazil. It is endorsed "=Trametes Rhizophorae" which is surely an error.

PUDENS.—Known from a single, young, half specimen at Kew, from India. It has a long rhizome and in some respects it resembles the preceding. I think not much can be ascertained from this single, immature type, but it may be recognized through comparison if found again.

POLYDACTYLUS.—This is known from one apparently abnormal specimen from Brazil. It has white context and a lateral stipe which divides and bears on the ends of the branches little, orbicular, disc-like pilei. The surface is minutely velutinate, brown, and marked with metallic zones. In its general nature I think it is related to corrugis of Europe.

ATRO-PURPUREUS.—This is also known from a single specimen from Brazil, and has the same context color and surface marking as the preceding. The pilei are thinner and borne in a different manner. The pore mouths are white, but when bruised are reddish. I think the plant is badly named.

II. CONTEXT BROWN OR GILVUS. SPORES WHITE (PROBABLY.)

a. STIPE NOT BLACK.

BRUNNEO-PICTUS.—Pileus suborbicular or reniform with a smooth, brown zoned surface. Context *brown,* hard, with hyphae deep yellow under the glass. Pores minute with pale mouths but brown context. Stipe lateral, hard, with dull brown surface. Spores not found, but I think without question are white. This is a rigid, well-marked species, known from several collections of Spruce, all from Brazil. When young it is thin, but becomes thicker with age. The thin, young specimens contract strongly in drying and were called Polyporus semiclausus by Berkeley.

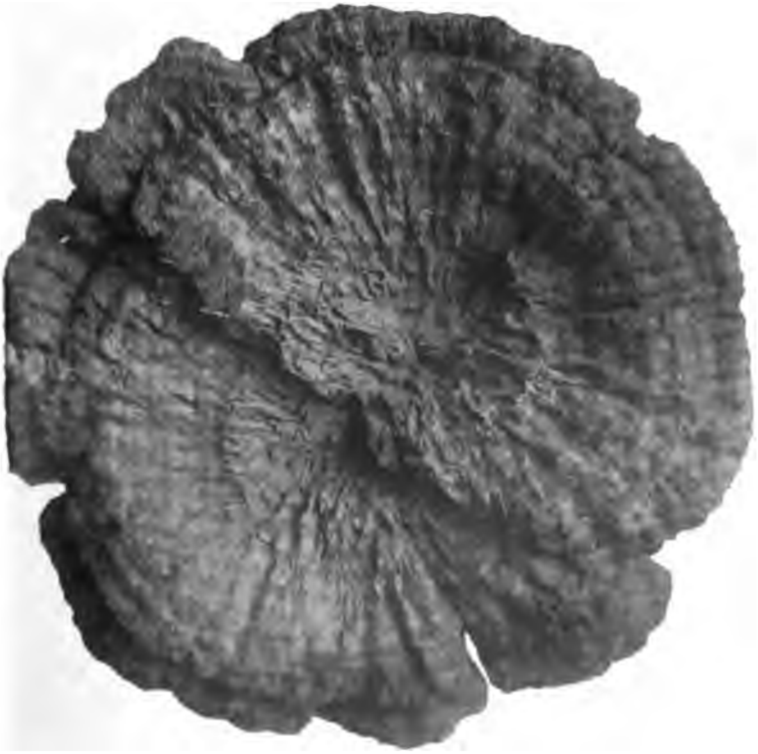

Fig. 424

Lignosus Zambesianus.
(Top of Pileus)

ZAMBESIANUS (Fig. 424).—Pileus strongly rugulose with a distinct, dull crust, brown, zonate. Context gilvus, rigid. Stipe mesopodal (but not preserved with the type). Pores small, 8 mm. deep, gilvus context and brown mouths. Hyphae bright yellow under the microscope. Setae none. Spores not found, but doubtless white. This is known from a single specimen, preserved at Kew and collected in Zambesi in 1881. It was misreferred to rudis. It is the only mesopodal polyporoid I ever saw with *gilvus* context.

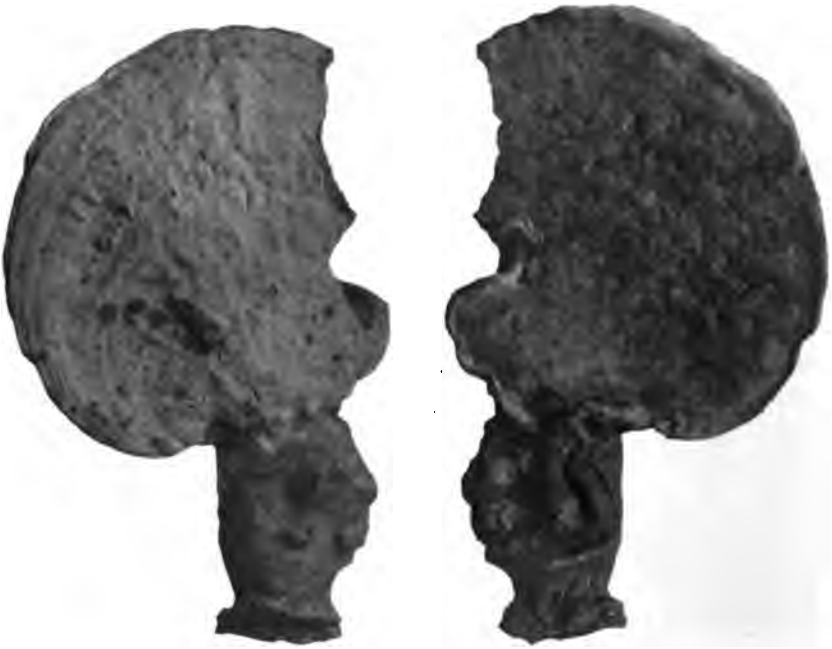

Fig. 425

Lignosus scopulosus.

b. STIPE BLACK—MELANOPUS.

SCOPULOSUS (Fig. 425).—Pileus with a smooth, pale, thin crust. Stipe lateral, black, with a black crust. Context punky, isabelline, with slender, pale hyphae. Pores minute, isabelline, with concolorous mouths. Spores hyaline. This is a frequent plant in the East and has been well illustrated by Reichardt under the name Trametes Rhizophorae, under which name it has been well known to me for a number of years. It is a noteworthy plant with its black stem, and smooth, pale pileus. It is given in Saccardo as a Fomes, but is a ligneous Polyporus or might be classed as a Trametes.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

Butignoti, Europe, Boudier (as Trametes, published?)=corrugis.

canalium, China, Loureiro. Too ancient and vague to be entitled to a place even in synonymy. "Described" 120 years ago and never seen since. Said to be "white and viscid."

hemibaphus, Brazil, Berkeley=obese camerarius.

obsoletus, Brazil, Fries. No type exists. I judge it is similar to brunneopictus.

pallidus, Brazil, Berkeley=camerarius.

Rhizophorae, East Indies, Reichardt (as Trametes)=scopulosus. It was well illustrated and has generally been called under this name.

rhodophaeus, Java, Léveillé. This was described as having a short, lateral stipe (or sessile). The type specimen (at Leiden) is sessile and is now referred to semilaccatus, which is I believe always a sessile species.

scleropodius, Africa, Léveillé=sacer.

semiclausus, Brazil, Berkeley=brunneo pictus.

Trogii, Europe, Fries. This was a name proposed for rugosus of Trog, but when Fries published it he called it Polyporus corrugis.

triqueter in the sense of Quélet is corrugis. Not the same as in the sense of Romell and Bresadola.

SECTION PETALOIDES.

We include in this section most species that have lateral stipes, embracing for the most part the divisions Petaloides of Polyporus and Discipedes of Polystictus as found in Saccardo. The more woody species (Lignosus) are classed in the preceding sections. Also in the section Melanopus are found those species with black, lateral stems.

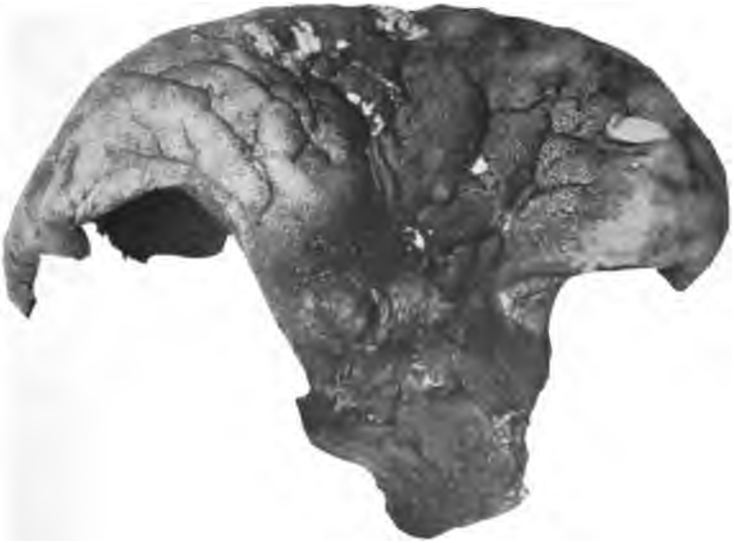

Fig. 426

Petaloides hirtus.

12. CARNOSUS. FLESHY, SOFT, THICK SPECIES.

HIRTUS (Fig. 426). —Surface brown, velutinate or hirsute. Flesh white. Stipe lateral. Spores peculiar, *fusiform*, 6 x 14-16, hyaline, smooth. A very rare plant both in Europe and the United States.

AQUOSUS.—This has a strong, lateral stipe. Flesh white, soft, watery, thick, drying thin. Pores small, white. Known from two collections, both from Brazil, also one (?) from India.

RUTROSUS.—A good picture of a petaloid, fleshy, white species with medium large pores, published by Rostkovius seventy years ago. Found or imagined in Germany, but known to no one since.

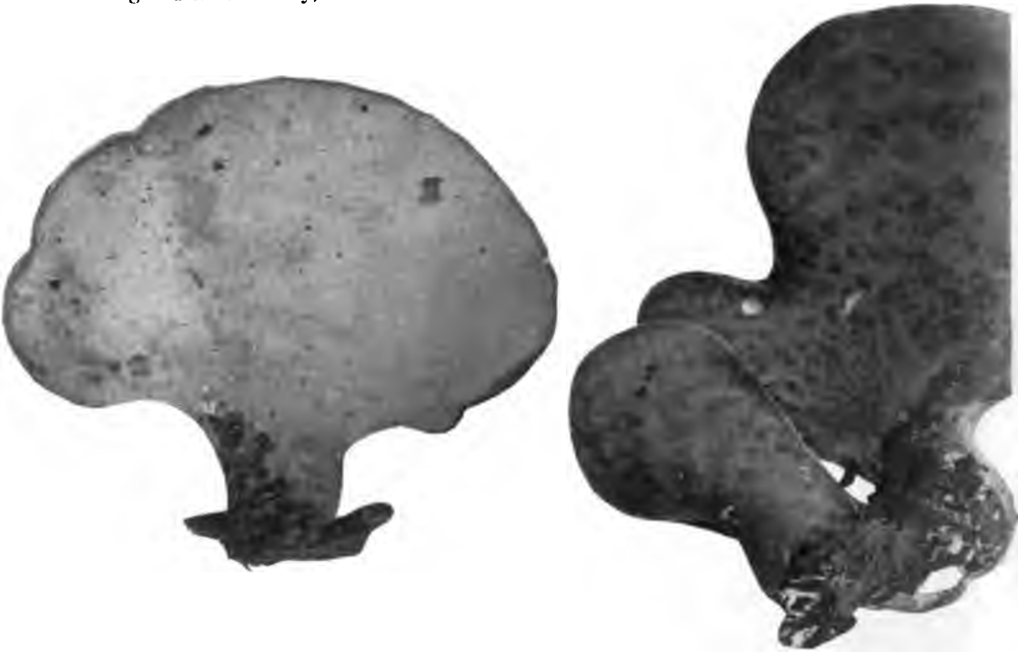

Fig. 427

Petaloides fusco-maculatus

FUSCO-MACULATUS (Fig. 427).—Flesh soft, watery, not "papyraceus-membranaceous" but so drying. Surface spotted with minute spots. Pores large. Spores oblong, 3-4 x 8-10. Found by me in Samoa. Has no relation to squamosus to which it was compared.

GLUTINIFER.—Known from a single, sliced specimen at Kew, and is I think probably the same as the preceding. It is said to have come from Mauritius, but it was more probably from Australia.

Osseus. See Addenda, page 191.

13. POLYPORUS. FLESHY, THIN SPECIES, COLOR WHITE OR PALE. PORES SMALL.

ANNULATUS (Fig. 428).—A small, white species with a short stipe expanded into a disc at the base. Originally from Java (well illustrated by Junghuhn). Found by me in Samoa. It grows attached to sticks on the ground.

RHIPIDIUM.—Stipe lateral, expanding above. Color white (?) when fresh, reddish when dried. Pores medium with thin walls. The type form is rare in the United States. It is large, but otherwise the same as the little form, called pusillus by Persoon, which occurs frequently throughout the tropical world.

FRACTIPES.—White, with a lateral, white stipe. Pores small, slightly rose colored. Surface dull. Rare in the United States. Also found in Brazil, by Rev. J. Rick.

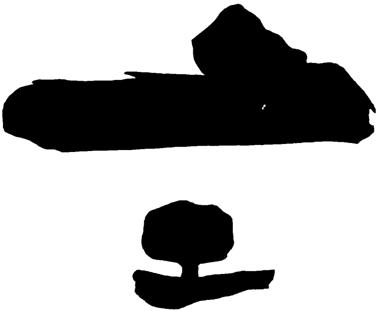

Fig. 428

Petaloides annulatus.

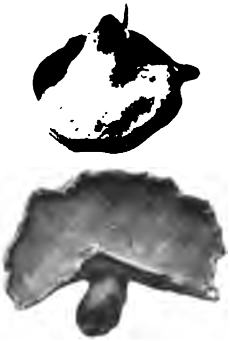

Fig. 429

Petaloides nivicolor.

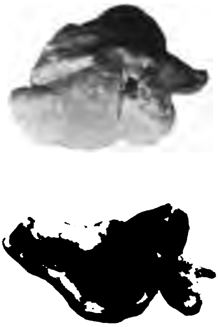

Fig. 430

Petaloides biokoensis.

NIVICOLOR (Fig. 429).—Pure white, with smooth surface. Pores small, white. Not truly stipitate, but the pileus extends behind into a stipe-like prolongation. Known only from New Zealand, but there are abundant specimens at Kew.

BIOKOENSIS (Fig. 430).—Pileus clear yellow when fresh, bleaching out to white in drying. Surface smooth, faintly zoned. Stipe short, lateral, concolorous. Pores minute, yellow when fresh, isabelline when dry. Spores (conidial?) globose, hyaline, smooth, 4-5 mic. The plant contracts in drying and the color change is unusual and marked. Very rare in Samoa, collected by me but once. Named by Bresadola. Type unknown to me. (Published?)

PENETRALIS.—Pileus spathulate, tapering to a long stem. Color pale. Pores small. Grew on stem of tree ferns in greenhouse in England. No type in the museums, but it is well illustrated. (Jour. Bot., 1875, t. 162.)

CANDIDUS.—Pure white with a lateral stipe. Pores small. Seems to be well illustrated (Persoon, Myc. Europe, t. 15), but is unknown from specimens in any museums or recent collection. Referred as being a form of chioneus by Fries, but it is surely not.

OBLIQUUS.—Context pale, darker in drying. Pores 1½-2 mm. long. Pileus with a long, lateral stem. Known from one collection, New Guinea, at Kew.. With the exception of long pores it has a resemblance to obovatus.

14. POLYPORUS. FLESHY, THIN SPECIES, COLOR WHITE OR PALE. PORES LARGE, FAVOLOID.

JANSEANUS (Fig. 431).—Pileus thin, fleshy, pure white, tapering to a long stem. Pores large, favoloid. Known from one collection from Java, preserved in alcohol at Berlin.

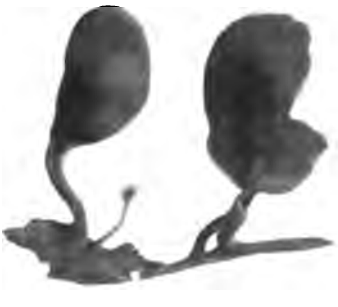

Fig 431

Petaloides Janseanus.

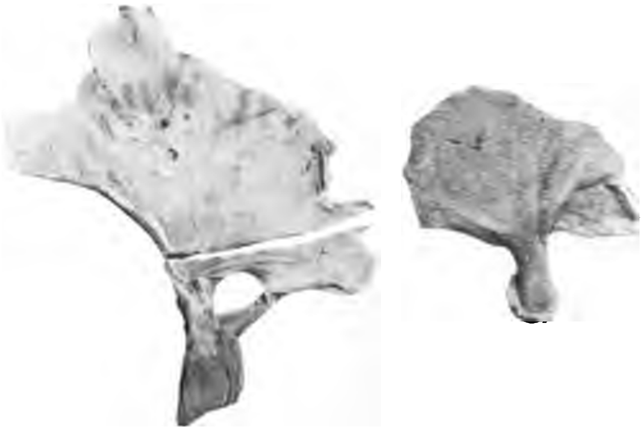

Fig. 432

Petaloides brachyporus.

BRACHYPORUS (Fig. 432).—Pileus thin, tapering to a lateral stipe. Pores large, *shallow*. Dried specimens dark and brittle, but I judge white or pale when fresh. Originally from French Guiana, in the herbarium of Montagne. There is also a collection at Berlin from Brazil, which Hennings has named as a "new species," but I have mislaid my memorandum as to what he called it.

15. POLYPORUS. THIN, RIGID. COLOR PALE ROSE OR REDDISH BROWN. NOT ZONATE OR ONLY FAINTLY ZONATE.

MODESTUS (Fig. 433).—Color when fresh pale cinnamon or rose, becoming in old specimens reddish brown. Pores minute. Surface dull. Rarely distinctly stiped, but reduced to a short stipe-like base. Appears to be frequent in tropical America and usually named by Berkeley albo-cervinus.

RUBIDUS.—This from the East is close to modestus, and I know of no marked difference. It is thicker, not so spathulate, and has but a faint indication of a stipe. I am told by Professor Petch that when old, dark discolored patches usually appear on the top. It is common to Ceylon and I think in other parts of the East.

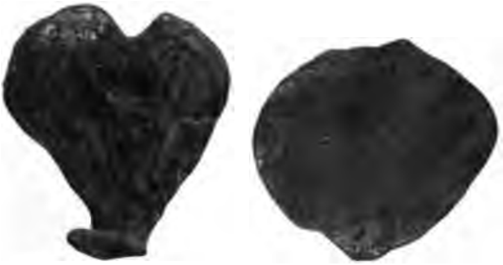

Fig 433

Petaloides modestus.

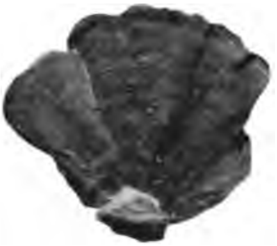

Fig 434

Petaloides Didrichensii.

BRUNNEOLUS.—The best specimen is in the British Museum. Those at Kew are poor. It is quite close to rubidus, but the context and general color are more brown. It seems to be common in the Philippines, and in recent determinations under the name atypus is confused with rubidus.

PETALODES.—Surface dark reddish brown with appressed fibrils. Context pale. Pores minute. Stipe lateral, thick. Known from a single specimen at Kew, collected in Brazil by Spruce.

DIDRICHSENII (Fig. 434).—Very similar to modestus, but with distinctly larger pores. Only type known, from Borabora (Society Is.), is at Kew. It seems to be frequent in the East and was received abundantly from Ceylon and called Menziesii by Berkeley.

BRUNNEO-MACULATUS.—Abundant specimens are at Kew, named brunneo-pictus by Cooke from Malay. They are light brown, with medium pores and subzonate, slightly rugulose pilei, marked with darker brown spots. It is the basis of the record of brunneo-pictus from Malay, in Saccardo, but has no resemblance to the original from Brazil.

MARIANUS.—Known only from the original. It is close to modestus, but not the same. The color is not the same and it is more rigid. The two following are close to Marianus.

ASPERULUS.—From New Caledonia. Type at Paris.

BRACHYPUS.—From West Indies. Type at Paris.

Konigii.—The only type at the British Museum from Ceylon comes in this section, but I have not a very clear idea of it

16. POLYPORUS. THIN, RIGID. STRONGLY ZONATE WITH GRAYISH ZONES.

GALLOPAVONIS.—Pileus rigid, thin, usually orbicular or reniform with short, lateral stem. Surface with narrow, concentric, gray zones. Pores minute, pale yellowish. Very common in the East, in Java, the Philippines, Samoa, and Australia.

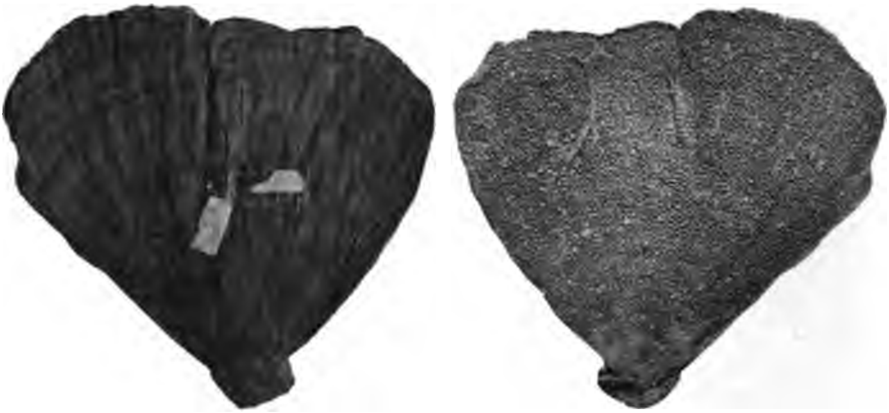

Fig 435

Petaloides Gaudichaudii.

GAUDICHAUDII (Fig. 435).—Pileus thin, with short, lateral stipe. Surface with narrow, concentric, gray zones. Pores medium. Close to the preceding but thinner, flexible, and the pores are distinctly larger. Specimen distributed in Zollinger's collection as Blumei belongs here.

INCURVUS.—Pileus thin, rigid, incurved in drying. Surface with strongly cinereous or fuliginous zones. Stipe lateral, from 2-8 cm. long. Pores small, dark. Specimens from Java and Malay.

17. PILEUS YELLOWISH BROWN, GILVUS. HYPHAE DEEP YELLOW UNDER THE MICROSCOPE.

MALIENCIS.—Pileus dark tobacco-brown, rigid, foliaceous, the type being crenately lobed. Stipe short, thick, lateral. Pores short, dark, small. Setae none. There are liberal collections at Kew from Perak.

ARATOIDES.—Close to the preceding and so referred by Bresadola. The type from New Caledonia is more even, not crenate. However, it is probably the same plant.

DISCIPES.—Close to maliencis, but *longer pores,* not foliaceous, and the type is not so dark in color. Type at Kew is from Ceylon.

GLAZIOVII.—Pileus orbicular, thin, brown, with long, lateral stem, in the same plane. Pores minute, brown. Context is thin, brown. Hyphae yellow (but not deep yellow, hence not truly in this section). Stipe lateral, dull surface. Spores not found, but I believe are white. Only known from specimens at Kew from Brazil.

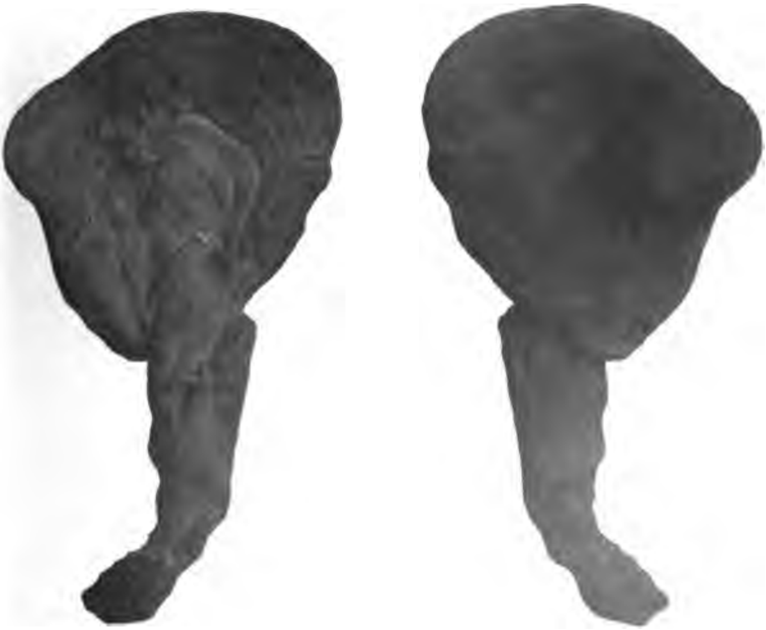

Fig. 436

Petaloides musashiensis.

MUSASHIENSIS (Fig. 436).—Entire plant brown, gilvus. Pileus orbicular, thin, dry, rigid, with soft, velutinate surface. Stipe laterally-dorsally attached, concolorous. Pores minute, concolorous, with soft, velutinate pore mouths. Colored setae rare. Spores not found but surely white. As to its context, color, velutinate surface and colored setae this corresponds to Fomes pomaceus, but the presence of a stipe removes it from all species with similar structure. Specimen collected by S. Kawamura, Japan. Referred to Hennings' species on the description only as there was no type in the cover when I visited Berlin.

18. GRAMMOCEPHALUS GROUP. PILEUS MARKED WITH RAISED LINES.

A varying assortment of plants that could be referred to one species, and still have marked differences. Those with large pores run into Favolus.

a. PORES SMALL. SETAE NONE.

GRAMMOCEPHALUS (Fig. 437).—The type form from the Philippines is orbicular or reniform, reddish brown with medium small pores. This is quite a frequent plant in several countries and seems to vary, so it is hard to decide what to consider as its varieties.

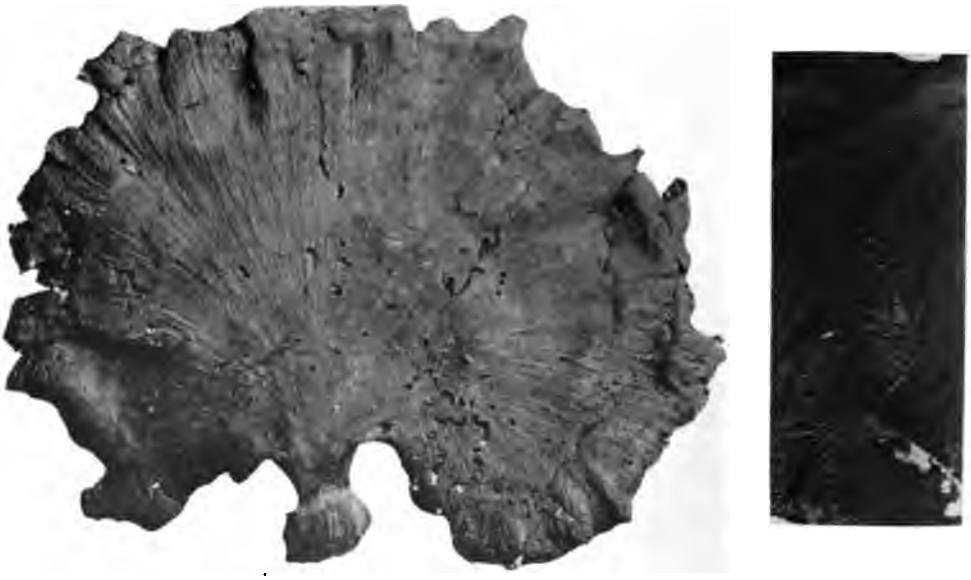

Fig 437

Petaloides grammocephalus.

PERVERSUS (Fig. 438).—Only a variety of grammocephalus, more spathulate and of darker color. Determined, published, and distributed (Copeland, No. 18) as Polyporus coracinus which, teste the description, viz.: with colored setae, and teste Bresadola, is quite a different plant. I have not seen coracinus except this evidently mis-named specimen. This form of grammocephalus is common in Samoa.

CAYENNENSIS (Fig. 440).—The American form from South America. Pores minute. Color pale, form spathulate.

SECTION PETALOIDES.

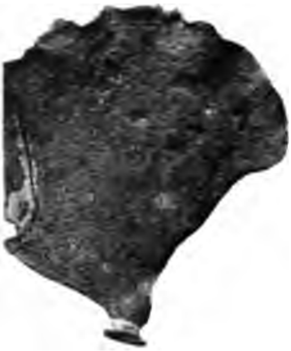

Fig 438

Petaloides perversus.

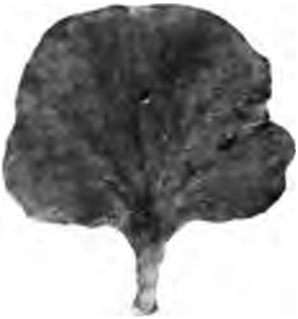

Fig. 439

Petaloides albellus.

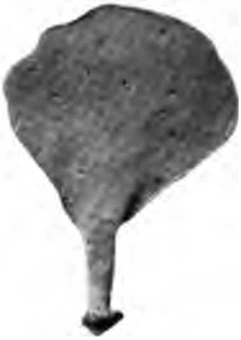

Fig. 440

Petaloides Cayennensis.

ALBELLUS (Fig. 439).—Similar to the preceding but has larger pores. White. From India, also from Chas. O'Connor, Mauritius.

MACULATUS.—A spotted form (?), dark, known only from a single specimen, Malay.

PLATOTIS.—Known from a partial specimen (Australia). It seems from the color, surface, and pores to be *thick* grammocephalus, but is much too thick, and apparently does not belong to the section.

b. PORES LARGE, FAVOLOID, RUNNING INTO FAVOLUS.

EMERICI.—Pileus the same as that of the type form of grammocephalus, but the pores are larger. From India.

FUSCO-LINEATUS.—This is an *obese* form of grammocephalus with a short, thick stem, 1-1½ cm. thick. The pores are larger than the type form. The surface is smooth, but lined. It was figured in the Trans. Linnean Soc., 2d series, vol. 1.

FAVOLOIDES.—(As a form of grammocephalus.) Pileus corresponds to the type form of grammocephalus, but the pores are large, favoloid. I think it is a better Favolus. Known from Africa.

DORCADIDEUS.—Color rich cinnamon brown. Surface velvety-tomentose with soft, brown hairs. Marked with branched, vein-like reticulations. Pores large, 2-3 mm. deep. Stipe short, lateral. The surface is covered with simple, colored hairs, which have no relation to those of russiceps. There are no cystidia on the hymenium. This strongly marked species is known from but one specimen at the British Museum, from Australia.

c. SETAEFERA.

Bearing on the pileus and in one species on the hymenium, very peculiar colored spiny or branched setae. See Fig. 441.

CINNAMOMEO-SQUAMULOSUS (Fig. 441).—Pileus and pores dark cinnamon brown, both densely covered with peculiar, colored, branched setae. Pores small. A most striking species known from collections of Dr. Zenker, Camerun, Africa.

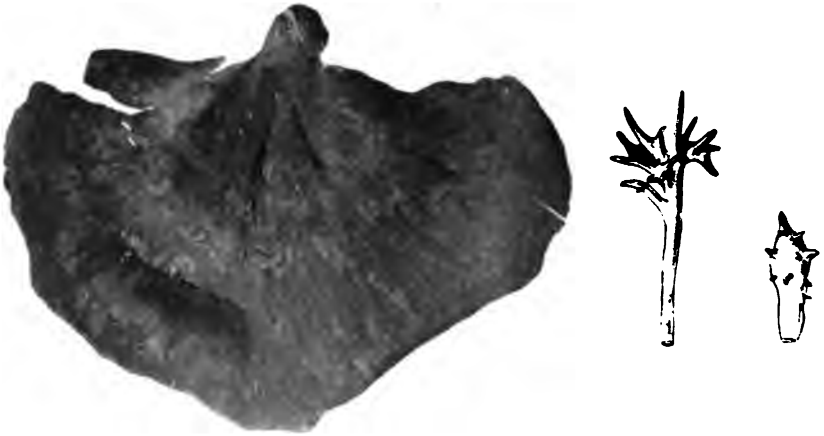

Fig. 441

Petaloides cinnamomeo-squamulosus with two types of peculiar cystidia found on the hymenium. (Drawing by Miss Wakefield).

RUSSICEPS.—Color of pileus dark cinnamon brown, same color and peculiar setae as the preceding, but in this species the setae are absent from the pores. Pores small, pale. Not a form of grammocephalus as given, but closely allied to the preceding. Only known from Ceylon.

19. POLYPORUS. SPECIES DARK COLORED, ALMOST BLACK AT LEAST WHEN DRY.

a. SETAEFERA.

MEGALOPORUS (Fig. 442).—Pileus dark, spotted, with short, lateral stipe. Pores large, subfavoloid. Hymenium with numerous very peculiar setae (same nature as those of the preceding section). Known from one specimen in Montagne's herbarium from South America. It is close to Favolus princeps in its peculiar setae, but otherwise I think it is different.

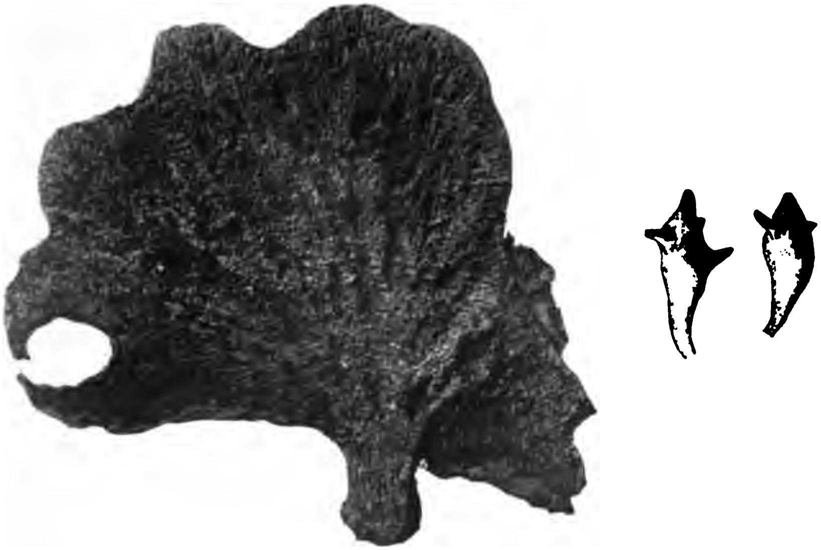

Fig. 442

Petaloides megaloporus with the peculiar cystidia. (Drawing by Miss Wakefield).

b. WITHOUT SETAE.

COCHLEARIFORMIS.—Plant black now but has probably changed in drying. Spathulate with a long stipe. Context thin, of peculiar, thick-walled hyphae cells such as have not been otherwise noted by me. Pores small, dark now. Spores globose, 5 mic., white. Only known from types at Kew, from Malay.

TRISTICULUS.—Color dark, almost black, thin, smooth. Pores small. Stipe short, lateral. Known from but two specimens, one at Paris and the other at Kew.

(Cfr. also stereinus and holotephrus in Section 22.)

20. POLYPORUS. COLORED CONTEXT AND SPORES.

(All of the preceding are supposed to have white spores.)

I do not know that there are any species with colored context and spores and lateral stems except in the section Ganodermus. The cotype specimen at Kew of Polyporus sideroides has these characters, but the type specimen at Leiden has a thick, spongy, pleuropodal stipe and would be looked for in section 35 of Spongiosus.

21. ABERRANT SPECIES FORMING "NEW GENERA."

POCULA (Fig. 443).—A little species, the smallest known, and for many years supposed to be a Sphaeria. A full account is given in Myc. Notes, Pol. Issue p. 44. It is not rare in the United States and occurs also in South America, Australia, and Japan.

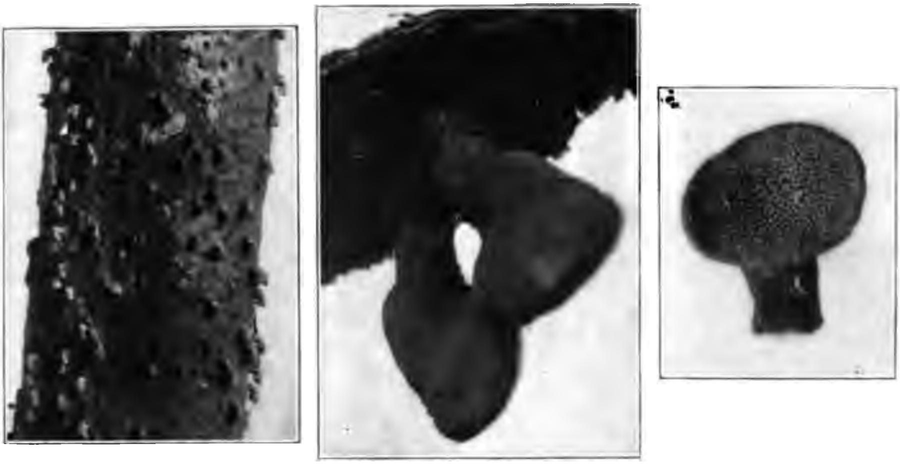

Fig. 443

Petaloides Pocula. Natural size; also two specimens (X6), and the face of pores (X6).

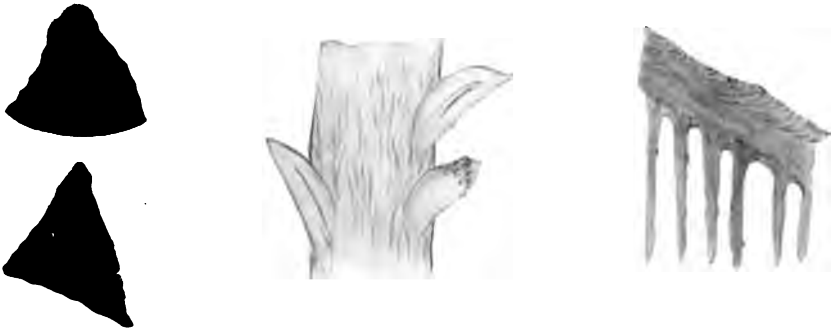

Fig. 444

Petaloides pusiolus. Enlarged six diameters. Also drawing by Miss Wakefield showing cystidia much magnified and a section of the pores enlarged.

PUSIOLUS (Fig. 444).—Pileus obconic, pendant, 3-4 mm. in diameter, with a short stipe. Surface brown, appearing velutinate from the enlarged projecting ends of the hyphae tissue. Context isabelline, the hyphae pale colored. Spores not found but on the hymenium are peculiar, horn shaped, acute, *hyaline* cystidia. This diminutive species came from Sarawak and there are co-types at Kew. I was much pleased to find in it an analogue of the little Polyporus pocula of the United States, heretofore supposed to be unique. It figures in our "literature" as a Fomes (sic). It is the antithesis of Fomes.

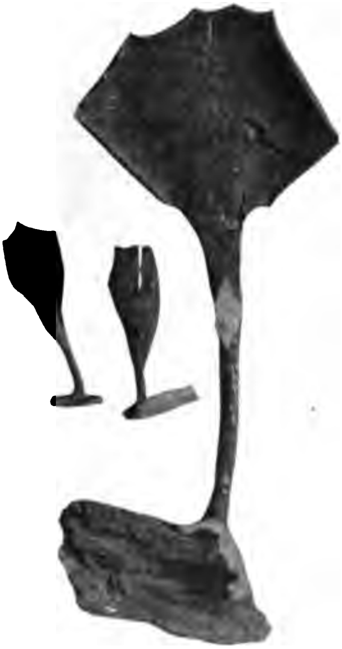

Fig. 445

Petaloides obovatus.

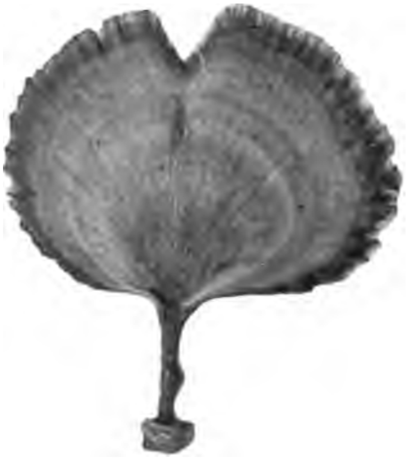

Fig. 446

Petaloides mutabilis.

22. POLYSTICTUS. PILEUS PALE (IN ONE SPECIES DRYING BLACK), USUALLY SPATHULATE OR FLABELLIFORM, THIN. PORES IN A THIN LAYER, WHITE OR PALE, MINUTE.

MUTABILIS (Fig. 446).—Pileus thin, marked with ochraceous or grayish zones. Very common in Brazil and also occurs in southern United States.

OBOVATUS (Fig. 445).—Very close to the preceding and I am not sure that it is distinct. It is not so strongly zoned. Usually tapering to the stem. Seems common in Java and the East. I have seen no authentic specimens of obovatus, but teste Bresadola, dilatus (bis) of Berkeley is a synonym and there is an abundance of that at Kew.

PETALIFORMIS.—Usually cuneate, tapering to the base. I judge from specimens I saw at Berlin that it has a rooting stem. Usually faintly zonate and marked with striations. Close to mutabilis and of the same distribution, but is quite different I think.

STEREINUS.—Pileus thin, attenuate behind and sometimes with a short stem, evidently soft and watery when fresh but drying thin, rigid, incurved, and turning black. It seems very common in tropical America, also from the East.

HOLOTEPHRUS.—Spathulate, attenuate at the base but hardly stipitate. Pores minute. Color almost black with metallic zones, and I think has not changed in drying. Known from the type at Kew from Cuba.

ARMENICOLOR. — Pileus thin, minutely pubescent, brown-zoned, tapering to a short but distinct stipe. Pores small, white. Except as to its distinct stem this plant is more closely allied to the versicolor group. It is known from one collection at Kew from Cuba.

ANTILOPUS.—This is quite a frequent plant in the museums, and I found it also in Samoa, that had been misdetermined either as russogramme or rasipes or palensis. It is referred by Bresadola to "vibecinus var. antilopus, Kalch." and it agrees with the cotype at Kew. No specimens of vibecinus are preserved and I think no one knows what it was.

23. POLYSTICTUS-MICROPORUS. LATERAL STEM.

(Cfr. also pleuropodal species page 173.)

The section Microporus, which has been held to be a genus, is characterized by its thin, rigid context, reddish brown color and minute pores in a very thin layer. We have published a "Synopsis of the section Microporus" with illustrations of the species.

AFFINIS (Fig. 447).—Stipe lateral, smooth, dark bay or black. Pileus smooth. Frequent throughout the East.

LUTEUS.—Same as affinis but more obese and thicker. Frequent and runs into affinis.

MAKUENSIS.—Same as luteus but with distinctly larger pores. Referred in my Synopsis as a synonym for luteus, which I think on re-examining the type is an error. Known from one collection at Kew from Africa.

PORPHYRITIS.—Probably the same as luteus, but from America, where all of this section are rare.

SECTION PETALOIDES.

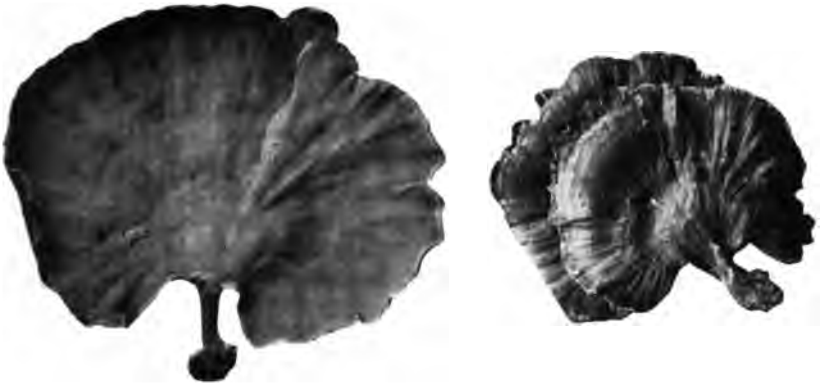

Fig 447

Petaloides affinis.

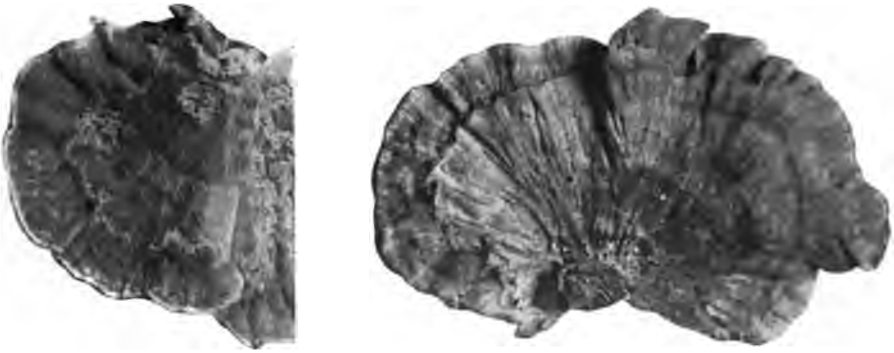

Fig. 448

Petaloides vernicipes.

CARNEO-NIGER.—Same characters as luteus except its black color. Occurs in the East. It is the same plant as microloma, an earlier name for it.

FLABELLIFORMIS.—Stipe black, lateral. Pileus with pubescent zones. Same as luteus except the pubescent zones of the pileus. It varies in all degrees however as to this character. It is the most abundant species in Africa, Samoa, and the East in general.

PTERYGODES.—Pileus sessile; hence does not belong to this section but placed here from analogy, as it is surely a sessile plant of the same nature as the other and perhaps simply a sessile condition of xanthopus.

24. POLYPORUS (CORRESPONDING TO POLYSTICTUS, BUT THICKER) WITH COLOR AND PORES OF THE SECTION MICROPORUS.

VERNICIPES (Fig. 448).—Pileus smooth, rugulose, faintly zonate, shiny, thick, 2-3 mm., rigid. Pores minute. Specimens from Japan, Philippines, and Africa.

SUBFULVUS.—Plant smooth, rigid, pale ochraceous, smooth, with a short, thick, sublateral stem. Pores concolorous, minute, rigid, 2-3 mm. long. Specimens (Wright 135 & 355) at Kew from Cuba, published as ochrotinctus of Bonin Island. Subfulvus was Berkeley's manuscript name and a good name for it.

SIENNAECOLOR.—Comparable to a thick specimen of Polystictus luteus. Same color and pores, but on the Polyporus order with a thick, short, dorsal stem. Known from one specimen from Ceylon. The Brazilian specimen cited was something else I think.

25. RED SPECIES.

SANGUINEUS.—Perhaps no other one species is as abundant in the museums as this. It is the common red species that grows in every warm country of the world. It is strangely rare in Samoa, however. A short, lateral stem, often disciform at the base, is a feature of most collections, but not always, as museum specimens are sessile and even dimidiate. It is close to Polystictus cinnabarinus, the red species of temperate regions, but typically it is thinner and smoother and I think cinnabarinus is never stalked. There is no other bright red species of the tropical world that is likely to be confused with Polystictus sanguineus. Bleached specimens are sometimes collected that have lost all their red color.

CINNABARINUS.—The red species of the temperate world, very similar to the above but thicker and not so brightly colored. It rarely if ever has a distinct stalk, hence does not belong in this section, but we so place it from its evident close relation to the preceding. While not stipitate, it is attached by a reduced base, rarely dimidiate, hence it is related even in its attachment to the stipitate species. Polystictus cinnabarinus is rather rare in Europe, usually on birch, very common in America and favors especially cherry and beech. While ordinarily easily distinguished from the southern species, sanguineus, specimens occur in intermediate territory that are hard to refer.

(Miniatus of Java from its shape might be sought in this section. The brittle, caseous flesh so closely allies it to sulphureus that we place it in that section.)

26. POLYSTICTUS. WHITE SPECIES.

CONCHIFER.—Pileus white, with a short, lateral stem. Bearing usually secondary, abortive pilei. For a full account see Polyporoid Issue page 41. A common plant, always on elm branches, in the United States.

Note.—A number of species of Polystictus such as the form elongatus of pergamenus, have the pilei usually reduced to an attenuate base and might be sought in this section.

Note.—Glaberrimus, South America, Montagne (as Irpex) and nepalensis, India, Berkeley and Pocos, Japan, Berkeley, each known from a single collection, have short, lateral stems, and would be sought here. Glaberrimus is close to biformis as to its pores. The types of nepalensis are quite poor and it may be the same as glaberrimus. Pocos has hirsute pileus and medium large pores.

SPECIES UNKNOWN TO ME.

Except leiodermus no specimens of any of these have been found by me in the museums of Europe

Agaricon, Java, Zollinger.
albo-luteus, Asia, Rostrup.
atro-albus, Africa, Hennings.
bambusicola, India, Hennings.
Baurii, Africa, Kalchbrenner.
cotyledoneus, South America, Spegazzini.
cuneatiformis, Philippines, Murrill.
decrescens, Java, Zollinger.
dilatatus, Java, Léveillé.
discifer, Java, Patouillard.
evanido-squamulosus, Africa, Hennings.
Gregonii, Africa, Smith
Gualaensis, South America, Patouillard.
hirto-lineatus, Java, Patouillard.
incompletus, Borneo, Cesati.
labiatus, West Indies, Patouillard.
leiodermus, South America, Montagne. My photograph and notes as to this plant do not agree, hence I can not refer it at present.
manubriatus, Sumatra, Léveillé.
monachus, South America, Spegazzini.
olivascens, Asia, Rostrup.
parvimarginatus South America, Spegazzini
Pentzkei, Australia, Kalchbrenner.
prostratus, China, Patouillard.
subhydrophilus, Brazil, Spegazzini.
subpendulus, United States, Atkinson.
substereinus, Cuba, Murrill.
tigrinus, Asia, Rostrup.
udus. Java, Junghuhn.
vitiensis, Pacific Island, Reichardt.

SYNONYMS AND REJECTED SPECIES.

Adami, Ceylon, Cooke. Change of dilatus (bis) which is obovatus.

albo-cervinus, Brazil, Berkeley=modestus. This is the name generally used by Berkeley, who took modestus correctly at first but afterwards changed on the evidence of a specimen in Kunze's exsiccatae which is not the same as the specimen in the same exsiccatae at Upsala.

anisoporus, Europe, Montagne. Type inadequate, probably a little, undeveloped specimen of Favolus europaeus.

annularius, Java, Fries. Merely an unauthorized and unnecessary change of annulatus of Junghuhn.

apophysatus, Europe, Rostkovius. Only known from an old picture which is probably something abnormal.

atro-cervinus, Brazil. Error in Saccardo for albo-cervinus.

atypus, Java, Léveillé. No type exists as far as I could find at Leiden. In the sense of Bresadola it is brunneolus. Determinations of Murrill are largely rubidus.

aurora, Borneo, Cesati (as Trametes). Not seen by me, but stated by Murrill to be a synonym for atypus, in which case it is probably rubidus, as many of Murrill's determinations of atypus are.

bomfinensis, Brazil, Hennings (as Fomes, sic)=Polystictus mutabilis.

caryophyllaceus, South America, Cooke. Type a little remnant, inadequate but probably or possibly mutabilis.

celebicus, East Indies, Hennings=carneo-niger.

cervicornis, West Indies, Cooke. Something abnormal, but not a synonym for mutabilis as stated.

cervino-nitens, South America, Berkeley (Schweinitz mss.)=modestus and was at first so referred.

cinerascens, East Indies, Léveillé. No type found by me. In the sense of Bresadola it is the same as incurvus, of which nice specimens are at Kew.

confundens, Borneo, Cesati=gallopavonis.

coracinus, Philippines, Murrill. Unknown to me. The specimen distributed to Kew (Copeland No. 18) and cited by the author is a form of grammocephalus, which does not have cystidia and is an entirely different species from the "type," teste Bresadola in a letter. I have not seen the type, but it was described as having "branched cystidia" and, teste Bresadola, is close to cinnamomeo-squamosus if not the same.

crenatus, Ceylon, Berkeley. This at best is a form of flabelliformis with the pubescence covering a small area at the base of the stipe rather than in zones. Only types are at the British Museum. Specimens of Léveillé's naming at Leiden and Paris are both wrong.

cretatus, United States, Cooke. Change of Ravenelii (bis) which being in his sense mutabilis was not worth changing.

cupuliformis, United States, Berkeley=pocula.

Currani, Philippines, Murrill=vernicipes.

decolor, Brazil, Berkeley. Type inadequate.

delicatus, United States, Berkeley=a small specimen of fractipes.

dendriticus, Mexico, Fries. No type exists. Fries cites Curtis' number 1481 which I do not find at Kew, but on Curtis' notes Berkeley has endorsed "arcticus, Klotzsch."

dilatus (bis), Ceylon, Berkeley=obovatus.

diminutus, Australia, Massee. Type is not preserved, but from the figure and description I have no doubt it was based on rhipidium.

eriopus, Borneo, Cesati. Unknown to me. Seems from the description to be flabelliformis.

fibro-radians, South America, Montagne=mutabilis or close.

flabellato-lobatum, Africa, Hennings. Teste Bresadola=cinerescens (brunneolus). I found no type at Berlin.

gallinaceus, Brazil, Berkeley=mutabilis.

geminella, Moeller, Brazil (as new genus, "Henningsii")=petaliformis.

hispidellus, United States, Peck=hirtus of Europe.

Holstii, Africa, Hennings, also in my Synopsis,=incomptus.

Hostmanni, South America, Berkeley. Type inadequate. There is a better specimen at the British Museum.

humilis, United States, Peck=fractipes.

hydrophilus, Cuba, Berkeley. Type inadequate. Compare stereinus.

inconspicuus, Africa, Miquel. Said by the author to be the same as Hostmanni.

intonsus, Tasmania, Berkeley. No type exists.

involutus, Europe, Britzelmayr. Not worth the trouble to bother with his cartoons.

Kurzianus, Java, Cooke=Blumei.

lacer, Java, Saccardo or Cooke, change of lacerus (why?).

lacerus, Java, Junghuhn=obovatus probably, more thin and tapering it seems to me.

languidus, Africa, Fries. (Fomes in Saccardo.) No type exists. Stated by Fries to be the same as monochrous, which if true is the same as modestus and surely not a Fomes.

lenzitoides, Brazil, Berkeley. Same plant as aquosus, which is a much better ame for it.

SECTION PETALOIDES.

Leprieurii (bis), South America, Montagne (as Enslenia)=pocula.

Léveilléi, Java, Cooke. Change of cinerescens, then changed back.

Libum, Australia, Berkeley. Type inadequate.

licmophorus, India, Massee=pale form of affinis or possibly a dark form of obovatus.

Liebmanni, Mexico, Fries. Type at Upsala, inadequate, a little piece about the size of an oyster cracker. Teste Bresadola it is the same as stereinus. It is black and curved in drying, but I think is rather thick for stereinus.

ligoniformis, Europe, Bonorden. Unknown. Alleged to be yellow, small pores, white flesh, reddish when broken.

liturarius, Pacific Island, Berkeley. No type exists.

malacensis, error in Saccardo for maliencis.

Meleagris, Pacific Island, Berkeley,=gallo-pavonis.

Menziesii, Sumatra, Berkeley=Didrichsenii.

microloma, Philippines, Léveillé=carneo-niger, and an earlier name for it. I have seen the type since my Synopsis was published, it having been placed in its cover since.

minutissimus, Asia, Rostrup. I have not seen this, but I judge from the description it is rhipidium.

Mollerianus, Africa, Saccardo. Teste Bresadola, this is a stipitate form of Polyporus vinosus. I have seen no stipitate forms. Bresadola refers vinosus to badius of Junghuhn, not Berkeley.

monochrous, South America, Montagne,=modestus. It was first referred to Feei. This is in the sense of Berkeley. "Monochrous, Mont." is quite a different plant.

murinus, Java, Léveillé. No type found by me at Leiden. Teste Fries and Bresadola it is same as brunneolus. Most of Murrill's Philippine determinations are gallopavonis.

Muelleri, Australia, Kalchbrenner is grammocephalus or a form at best.

nanus, Australia, Massee=rhipidium.

nigrescens, Brazil, Cooke=stereinus (??)

notopus, Java, Léveillé. (Nothopus in Saccardo.) The type at Paris is a little specimen, too inadequate to form an opinion.

palensis, Philippines, Murrill. I have seen more than one species so named by the author, but most of them I would refer to antilopus.

peltatus, Central America, Fries. No type exists.

pendula, an alleged synonym for pocula used as a juggle. Not based on any evidence but is contrary to the specimens of the author.

peroxydatus, Australia, Berkeley. No type exists.

petaloides, Europe, Fries. No specimens or figures exist. It was based on one collection sent from Pomerania. Unknown now.

phlebophorus, New Zealand, Berkeley. Same as nivicolor, which is a much better name for it.

polygrammus, Cuba, Berkeley=petaliformis.

pseudo-cinerascens, New Guinea, Hennings=gallo-pavonis.

puellaris, Pacific Island, Kalchbrenner=atypus, teste Bresadola on the label at Berlin. For me atypus in sense of Bresadola is brunneolus.

pusillus, West Indies, Léveillé (or Persoon, mss.)=rhipidium.

putidus, Central America, Fries. No type exists.

rasipes, East Indies, Berkeley=obovatus.

Ravenelii (bis), United States, Berkeley. No type found by me. In the sense of Cooke it=mutabilis. There is a cotype in the British Museum from Ravenel, which is same as mutabilis, but has no resemblance to dealbatus as erroneously stated.

rigescens, Perak, Cooke=stereinus.

rufo-ochraceus, South America, Patouillard=mutabilis.

russogramme, East Indies, Berkeley. Type inadequate. It has large pores and seems to be something well marked.

squamaeformis, Borneo, Berkeley. No type exists.

stereoides, Cuba, Berkeley. Not published but is a manscript name for plants published as stereinus. The reference in Saccardo, p. 219, probably refers to a Brazilian collection which is mutabilis.

sterinoides, Brazil, Hennings=petaliformis.

Stuckertianus, South America, Spegazzini. Seems from the description to be rhipidium, the large, type form.

subflabellum, Africa, Hennings. The types are in alcohol and I can not form much of an opinion of them.

subpulverulentus, Cuba, Berkeley. A form of rhipidium at the best.

subverniceps, Philippines, Murrill=pterygodes.

subvernicosus, Brazil, Hennings=porphyritis or close to it. It seems to be a slightly thicker plant.

subzonalis, Australia, Cooke=gallo-pavonis, pale form.

tomohomiensis, East Indies, Hennings=grammocephalus.

torquescens, Africa, Saccardo=biokoensis, teste Bresadola=zonalis, teste Patouillard. Unknown to me.

unguicularis, Mexico, Fries. No type exists. Judging from the description it is probably the same as mutabilis. Mr. Murrill informs us that it is "only known from the type locality" and that he did not examine the spores. As he evidently never saw a specimen, as none exists, it would have been much more strange and worthy of record under the circumstances if he had examined the spores.

vernicifluus, Tasmania, Berkeley. Type inadequate.

vibecinus, Africa, Fries. No type exists. From the description it is close to grammocephalus.

virgineus, United States, Schweinitz=conchifer.

virax, India, Berkeley. Types at Upsala seem the same as Liebmanni to me on comparison, but I am not so certain that it is the same as stereinus.

SECTION MERISMUS.

The section Merismus embraces plants that have numerous pilei proceeding from the branching of a common stem or rootstalk. Some of them form very large clusters. We also include here the section Conglobatus where the pilei proceed from a common tubercular core. As a matter of truth the section Conglobatus is quite different from Merismus in its manner of growth, but we include it here in order to reduce the number of sectional names.

27. SPORES GLOBOSE, ECHINULATE.

Plants of this section having echinulate, globose spores form a very natural group.

BERKELEYI.—Pilei imbricate, arising from a short, thick stem or root stalk. Surface pale, dull, slightly tomentose and obscurely zoned. Context (½-1 inch thick), white becoming isabelline in old specimens, brittle when dry. Pores large, unequal, white. Spores globose, 8 mic., distinctly echinulate. This is the largest and a quite frequent species in the United States, growing usually at the base of a tree.

MONTANUS.—This is the European analogue of Polyporus Berkeleyi, and has the same surface, context, spores, and general character. It is much smaller and simpler and more regular. It is quite a rare plant in Europe and very few specimens are in the museums. It occurs in the Alpine regions of France, extending east.

Dickinsii.—This, which is known from a single pileolus at Kew, from Japan, is thinner but seems to have the same context and spores as Berkeley's and is probably the same plant.

ZELANDICUS.—Pileus thin, lentus. Pores large and lacerate. Spores globose, hyaline, echinulate. Known from one collection at Kew from New Zealand. As to pilei it is very similar to giganteus, and as to spores it is similar to Berkeleyi.

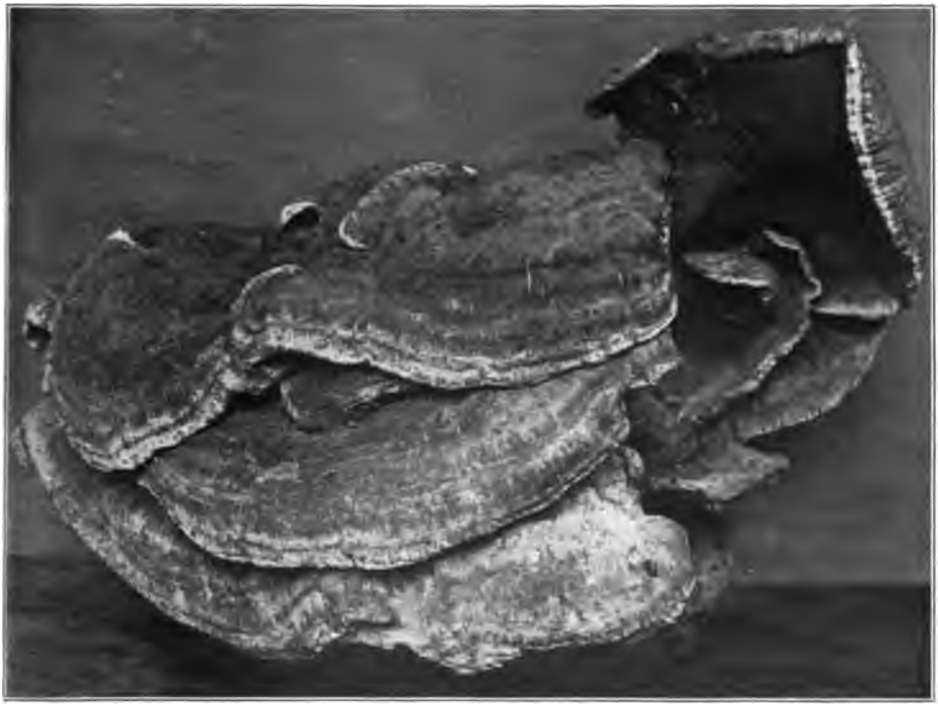

Fig 449

Merismus Talpae.

TALPAE (Fig. 449).—Pilei very large, forming a clump several feet in diameter. Surface dark, dull, minutely velutinate, soft to the touch. Pores in the dried specimen small, cinereous. Spores globose, hyaline, 8 mic., slightly rough. This is the largest known species of fleshy Polyporus. A specimen from Dutch Guiana at Leiden measures 7 2/3 feet in circumference. It occurs only as far as known in Brazil and other parts of northern South America.

28. SPORES SMOOTH, HYALINE. PLANTS FLESHY.

UMBELLATUS (Fig. 450).—Stem dividing into many branches, each bearing a small pileus centrally attached. Flesh white. Pores decurrent on the branches of the stem, with angular mouths. Spores 3 x 10, hyaline, smooth. The stem is said to arise from an underground, thickened rootstalk or sclerotium. This is a most striking and peculiar species and very rare both in Europe and the United States.

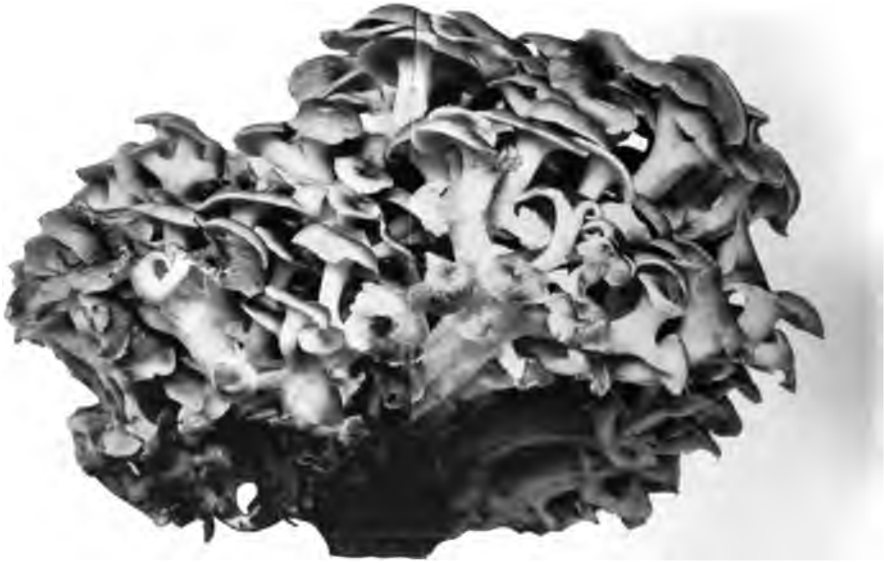

Fig. 460

Merismus umbellatus. (Reduced more than half).

FRONDOSUS.—Pileoli very numerous, imbricate, dimidiate or spathulate, fuliginous gray, with white, decurrent pores. They proceed from a common root stalk. This species, which is quite common both in Europe and the United States, sometimes forms large clusters two feet in diameter. It usually grows at the base of a tree or stump. It can be readily known from the more rare species (umbellatus) by the insertion of the pileoli, though in their general habits they are very similar.

WYNNEI.—Pileus merismatoid, imbricate, irregular, semi-incrusting, and in habits of growth resembles somewhat Thelephora terrestris. Upper surface yellowish brown, smooth but uneven, rugulose. Context thin or a mere pellicle. Pores medium, elongated, round, 4 mm. long. Spores globose, 3 mic., hyaline, smooth. When fresh this is soft and would hardly be sought in Polystictus where it is placed in our text books. It is quite a rare plant, known from England, France, Germany. It is not a true Merismus, but is more close to this section than any other in its appearance and habits.

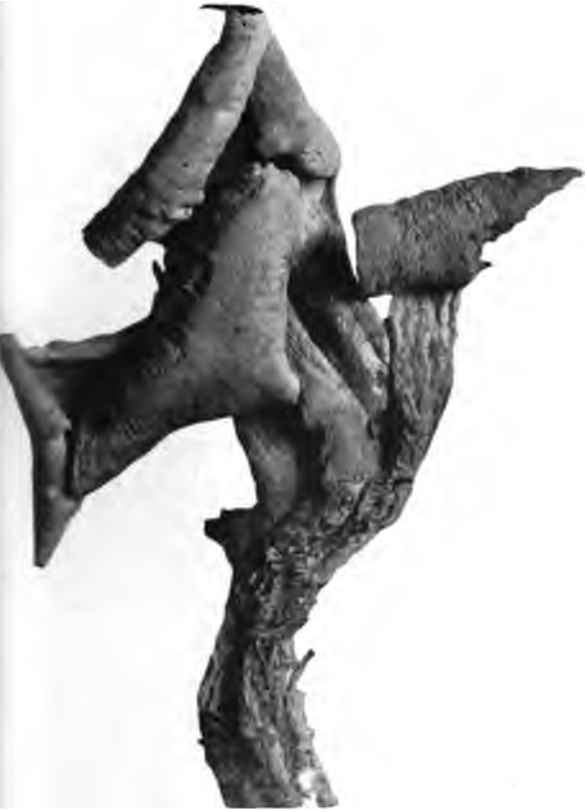

Fig. 451

Merismus cremeo-tomentosus.

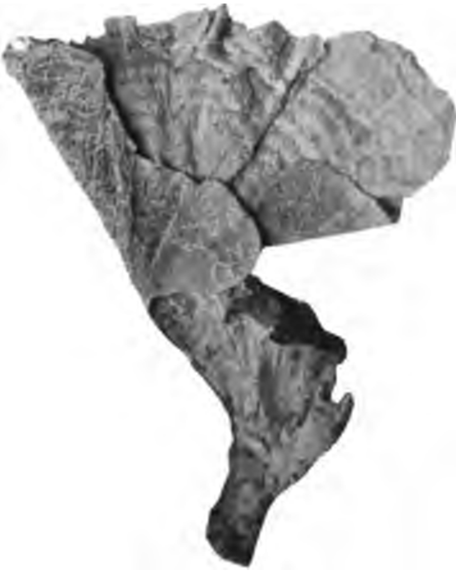

Fig. 452

Merismus Ridleyi.

GIGANTEUS.—Pilei thin, tough with a dark brown surface and white pores that turn dark when bruised or in drying. Spores globose, 5-6 mic., hyaline, smooth. This which is large, but hardly large enough to be called "giganteus," is of frequent occurrence in both Europe and the United States. It is similar to frondosus but thinner with larger pilei and is tougher.

ANTHRACOPHILUS.—Pilei arising from a hard, woody rootstalk, flabelliform, tapering at the base. Surface rugulose, dark. Pores white when fresh. Spores 4 x 5 subglobose, hyaline, smooth. This plant is very similar to giganteus in some respects but is smaller and the dried specimens are hard and subwoody. It is only known from one or two collections at Kew, from Australia.

CREMEO-TOMENTOSUS (Fig. 451).—Pilei thin, flabelliform, tapering to the base and proceeding from the apex of a woody rootstalk, contracted and curved in drying. Surface soft, velutinate. Pores minute. The entire plant is a pale isabelline color. The several pilei proceeding from the apex of a woody rootstalk might be treated as simple pilei and classed in Section 12. It was described by Hennings as a Fomes. It never was a Fomes. Known from a single specimen from Ule, Brazil.

MULTIPLEX.—Pilei numerous, small, imbricate, with very much the appearance of being small Polyporus frondosus with similar general habits and pores. At the base, however, there are numerous white, mycelial fibrils, and it grew on rotten wood, totally at variance with the method of growth of frondosus. Known from a single specimen at Kew from Mueller, Australia, but I believe was not formally published.

LITHOPHYLLOIDES.—Only known from the types from Japan at Paris. They are black now, probably discolored from having been sent in alcohol. The small, imperfect pilei proceed from a thick, rooting system. It is quite different in appearance from all others and was compared by the author to the genus Lithophyllum, which seems to be a genus of seaweed.

29. MERISMUS-POLYSTICTUS. THIN PLANTS HAVING THE HABITS OF THE SECTION MERISMUS.

RIDLEYI (Fig. 452).—Pileus thin, flabelliform, tapering to the base and proceeding from a rootstalk. Surface smooth, even, gray and beautifully zoned. Pores white, rather large, shallow, elongated. This is a fine species, having the same texture and color and zones as Section 16, page 134, but is merismatoid in its habits of growth. Known from one collection at Kew from Tasmania.

COLENSOI.—Pileoli very numerous, much branched and crispid, thin with dark surface. Pores probably white when fresh, large, shallow. Known from a single rather poor collection at Kew from New Zealand. In general appearance it resembles Polyporus frondosus but is much thinner and has smaller pileoli.

FIMBRIATUS (Fig. 453).—Pileus thin, usually imbricate-multiplex, but often more simple, variously cut and lobed. Color pale, dark when dried. Pores white, shallow, usually imperfectly developed and incomplete, the portions of the undeveloped pore walls resembling

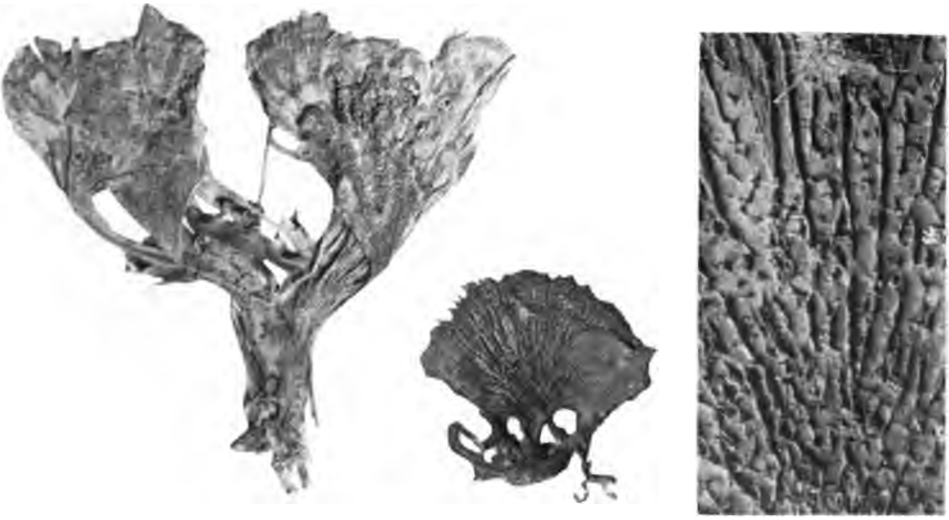

Fig. 453

Merismus fimbriatus with section of the hymenium enlarged.

in a faint degree a Hydnum. Spores ovate, 4x5, hyaline, smooth. This is a common species in Brazil and abundant specimens have been sent to Europe, particularly by Glaziou. Owing to the peculiar hymenium it has been variously classed as Polyporus, Polystictus, Hydnum, Thelephora, Craterellus and Beccariella, with a corresponding number of specific names.

30. MERISMUS CASEOSUS.

I am not sure that the plants listed here are all merismatoid. The common species of Europe and America, Polyporus sulphureus, when growing at the base of a stump usually has a common stem or tubercle, but on the side of a tree it is often sessile, in several imbricate layers. Sometimes on logs it occurs that it has a single pilei, each with its lateral stem. The feature common to all the following species is the caseous, brittle flesh, light and crumbling when dry.

SULPHUREUS.—Pileus bright reddish yellow and when in its prime furnished with a yellowish juice. When old it loses its bright color and becomes dry, light and crumbling. Pores minute, bright sulphur yellow when in prime condition. This is a common species in both Europe and America and occurs in Ceylon, Mauritius, and probably many countries. On the oaks where it habitually grows in Sweden it forms large, conspicuous masses noticeable from a distance. In the United States a form with a stem is quite common at the base of stumps. I have also collected it growing with simple, flabelliform pilei, each with its own short stem.

MINIATUS (Fig. 454).—This is represented at Leiden by the type from Java also a colored drawing. It is simple, thin, with a short, lateral stipe, and is brick-red when fresh. It loses its color with age and has the same brittle flesh and other characters, and I take it to be only a small, simple, thin form of Polyporus sulphureus.

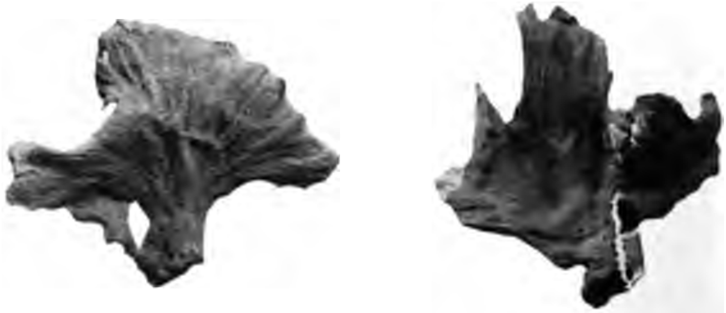

Fig 454

Merismus (Caseosus) miniatus.

SORDULENTUS.—Named from a single, small collection from Chile. It has the same habits, texture, context color (of discolored specimens) and surface, and in my opinion is only a form of Polyporus sulphureus. The pores are distinctly larger than the European form which, as far as I can note, is the only real difference.

RETIPORUS.—This from Australia has the appearance of being sulphureus with larger pores and firmer context. I think it will prove to be only a form.

31. CONGLOBATUS CARNOSUS.

I believe there is no true fleshy species with central core, but that Polyporus sulphureus rarely takes this form. Such a specimen was distributed collected by Toldt in Tirol under the name Polyporus imbricatus. I judge it is the same plant that was named Polyporus flabellatus by Bresadola.

32. CONGLOBATUS FOMES.

But one species of Fomes is known with imbricate pilei proceeding from a central core. (Cfr. Pol. Issue, p. 43.)

GRAVEOLENS (Fig. 455).—Pilei numerous, densely imbricate like tiles, on a hard, woody, central core. Context and pores brown and of a hard, woody texture. Pores minute with darker mouths. Spores not found by me, but I think are hyaline. A unique species known only from the United States. It is not common and found only so far as known on oak or beech.

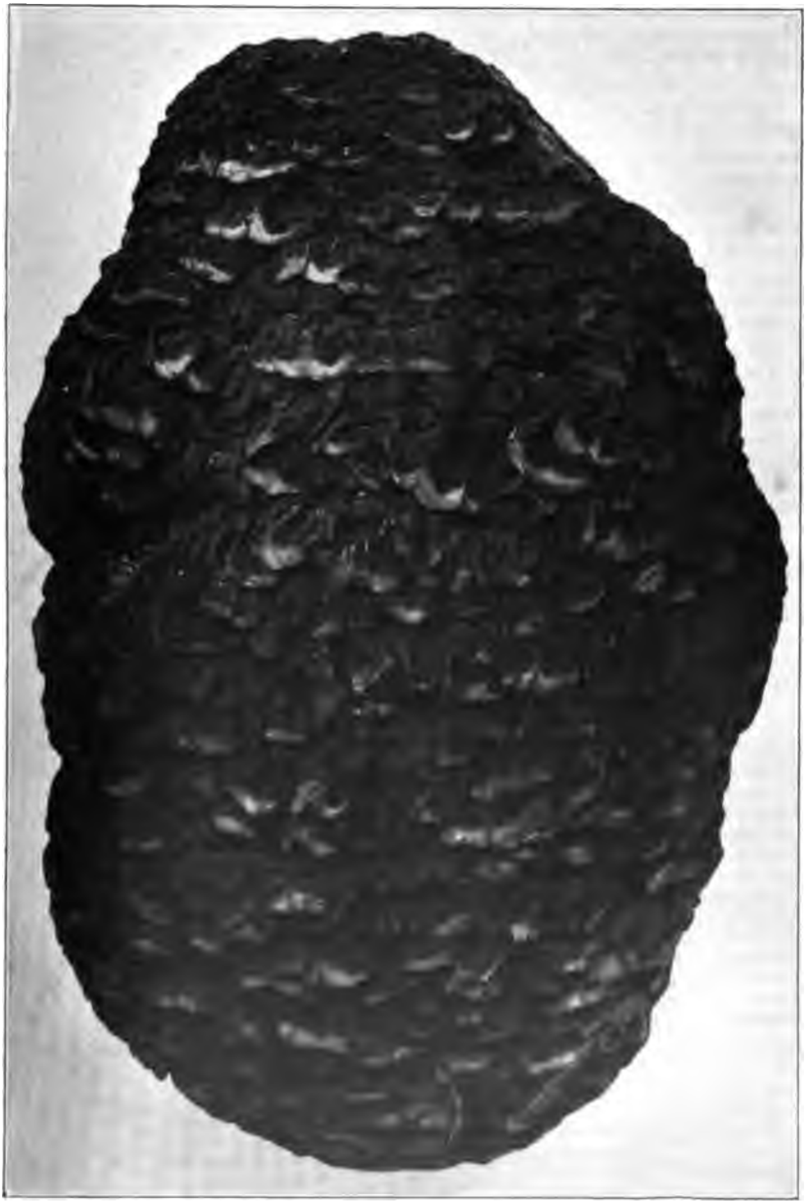

Fig. 466

Fomes graveolens.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

acanthoides, Europe, Bulliard. In the sense of Fries a flabelliform specimen of rufescens. In the sense of Bulliard a poor picture of giganteus. Used as a juggle for giganteus by Quélet.

alligatus, Europe, Fries. Based on Sowerby, t. 422, but no such species known. The picture probably represents an unusual development of rufescens.

amygdalinus, United States, Berkeley. The type is very poor, so poor I doubt that it could be recognized on comparison. Said by Ravenel, the collector, to have a strong odor of vanilla or almond. It does not belong in the section Merismus.

anax, United States, Cooke. Berkeley's manuscript name for the plant that had been named Polyporus Berkeleyi. The species was one of Cooke's posthumous varieties.

Barrelieri, Europe, Viviani. Plate 28 cited by the author is a good picture of sulphureus. Plate 36, cited by Fries, is frondosus.

Beatiei, United States, Peck=Berkeleyi.

bonariensis, South America, Spegazzini. Unknown.

botryoides, "incog.," Léveillé=Fomes graveolens, which being such an obvious fact, was a long time being found out. I dug the type out of a cupboard at Paris and at once recognized it.

caespitosa, Brazil, Cooke (as Beccariella)=fimbriatus.

candidus, Europe, Roth. Unknown to me. No illustration. No specimens in museums. Bresadola told me that he considers it a good species, but I only know what he told me in conversation. I have never seen the plant.

casearius, Europe, Fries. Generally admitted to be only a discolored form of sulphureus.

Ceratoniae, Europe, Risso. Based on Barla's Icon. t. 30, f. 1-3, which is surely only sulphureus.

Cincinnatus, United States, Morgan=sulphureus, a bright colored form that grows in great abundance at the base of stumps, at Preston, Ohio.

conglobatus, United States, Berkeley=graveolens.

discolor, Mauritius, Klotzsch=sulphureus.

eurocephalus, Ceylon, Berkeley. The type is much decayed and full of globose, strongly asperate, hyaline spores. Teste Petch, these are spores of a Hypomyces, and in viewing them in that light I think it is correct, though I had no suspicion of it when I examined it and mistook them for the spores of the plant.

flabellatus, Europe, Bresadola. From the description I think it is the same plant as has been distributed from Tirol by Toldt as Polyporus imbricatus. In my opinion it is an abnormal development of Polyporus sulphureus.

Glaziovii, Brazil, Berkeley. This was included in Cooke's Praecursores twice, No. 166 and No. 394, the first as a Polyporus, the second as a "Fomes," and both with the *same citation*. The second as a "Fomes" is a Polyporus (cfr. page 135) and the first as a Polyporus in section Merismus is an illusion or error of some kind.

Glaziovii (bis), Brazil, Hennings=Talpae.

helopus, Exotic, Patouillard. This is based on a single specimen preserved in the museums at Paris. It is probably abnormal and surely adventitious and was found in the Jardin des Plantes.

imbricatus, Europe, Bulliard. Said by Fries to be rare and local in Sweden and is unknown to any one now. I think it was based on intybaceus that grew horizontal, hence the lobes are more flat. The common plant called intybaceus in England is surely frondosus. Most modern books carry both, but I think no one knows two different plants to correspond.

irregularis, England, Sowerby. The Icones 423 was referred to amorphus by Fries. The color is not right for amorphus. When Berkeley first met Polyporus Wynnei he referred it to this picture and sent specimens to Montagne. It has a general resemblance to Wynnei, but Sowerby's mention of "shallow pores" does not accord.

lactifluus, United States, Peck=Berkeleyi.

lobatus, Europe, Hudson. Unknown. Fries cites Schaeffer, t. 316 & 317, which are too crude to even be cited. Although attributed to Hudson, this plant was never known to English mycologists.

Merrittii, Philippines, Murrill=sordulentus.

multiceps, South America, Patouillard. Unknown to me.

multifida, Portorico, Klotzsch (as Thelephora)=fimbriatus, teste Bresadola on a label.

Oleae, Europe, Panizzi. Unknown to any one I think.

Oxyporus, Europe, Sauter. Unknown to any one I think.

Pauletii, Europe, Fries. Based on an old crude figure from which nothing whatever can be told.

plumarium, Cuba, Berkeley (as Hydnum)=fimbriatus. Some of the "plumes" are sterile, proliferous pilei on this particular type specimen. While there are many specimens of the plant in the museums under many names, I think the "plumes" are "only known from the type locality."

ramosissimus. An old name often used as a juggle for umbellatus.

ramosus, United States, Schweinitz. Published? Poor specimens, but authentic, are frondosus.

Rostafinskii, Europe, Blonski. Unknown to me, but the description seems to be sulphureus.

rubricus, India, Berkeley. Based on decayed, discolored specimens of sulphureus.

scabriusculus, Australia, Berkeley. No type exists.

sparassioides, South America, Spegazzini (as Craterellus)=fimbriatus.

speciosus. An ancient relic of Europe, 1755, alleged to be the same and used as a cheap juggle for Polyporus sulphureus.

subgiganteus, United States, Berkeley,=Berkeleyi, as Berkeley did not seem to know his own namesake.

Sumstinei, United States, Murrill,=the common Polyporus giganteus both of Europe and the United States and which has not the slightest difference as it grows in either country. I should think Mr. Sumstine would feel quite proud of the honor.

Todari, Europe, Inzenga=sulphureus.

trichrous, United States, Berkeley. No type exists.

Warmingii, Brazil, Berkeley=fimbriatus.

SECTION SPONGIOSUS.

The section Spongiosus embraces those species with soft, light, spongy flesh. These characters are more strongly evident in the dried specimens.

33. CONTEXT PALE OR WHITE. SPORES WHITE.

RUFESCENS (Fig. 456).—Pileus soft, spongy, hirsute. Pores large, daedaloid, pale flesh color when fresh. Spores are globose, 8 mic., hyaline, smooth. Also usually abundant, conidial spores 4 x 6, hyaline, smooth, oval. Not rare in Europe and quite variable. When well developed with a mesopodal stem as shown in Fig. 456 and Persoon's Icones Pictae t. 6, often more pleuropodal stem, Sow. t. 191, or lateral stem or even dimidiate (var. flabelliforme of Persoon). In the United States perfect forms occur but very rarely. A distorted form is more frequent, called Polyporus distortus. The pores of the European form are large and daedaloid and in France it is often called Daedalea biennis. In the United States there is not such a strong daedaloid tendency. The two following should be held as forms.

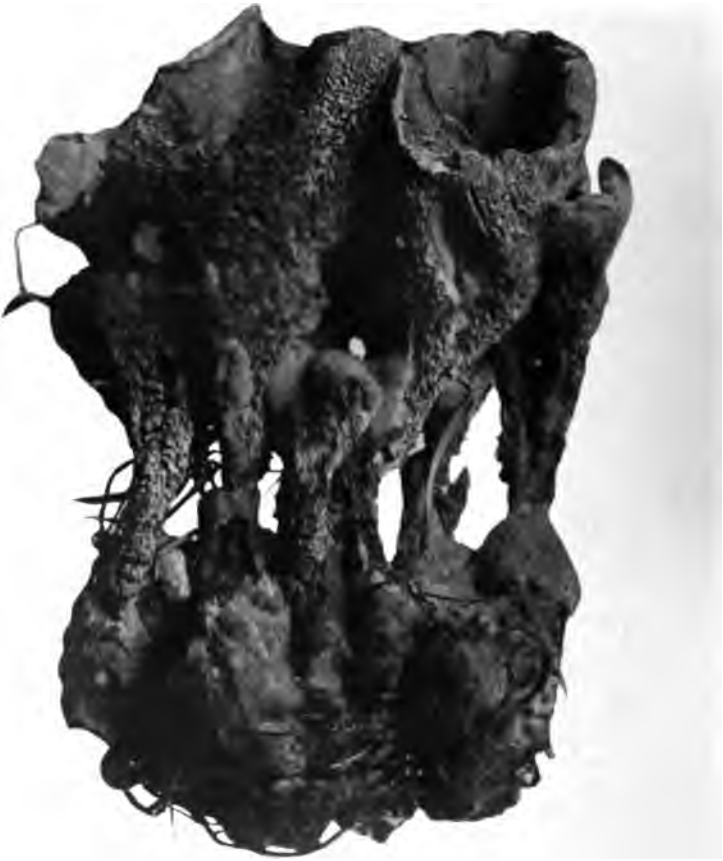

Fig. 456

Spongiosus rufescens.

HETEROPORUS (Fig. 457).—The flabelliform or dimidiate form of Polyporus rufescens. Frequent in Europe. Apparently absent from the United States.

DISTORTUS (Fig. 458.)—A frequent plant in the United States which I believe to be only a distorted form of Polyporus rufescens. Rarely perfect forms are also found in the United States.

ANTHELMINTICUS.—A plant said to be used in India as an anthelminthic is not represented in the museums of Europe by specimens good enough to tell much about its classification. It was compared to rufescens by Berkeley.

HYSTRICULUS (Fig. 459).—Known from a single specimen at Kew from Australia, but strongly marked. Surface with rigid, dense, dark hairs. Flesh white, soft. Pores round, medium, flesh color. Spores probably conidial, globose, hyaline.

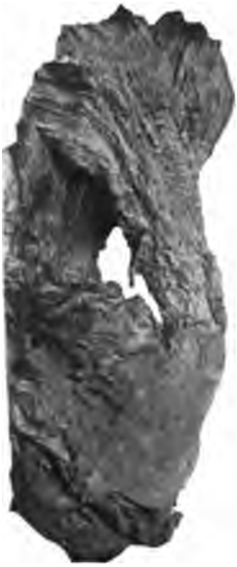

Fig 457

Spongiosus heteroporus.

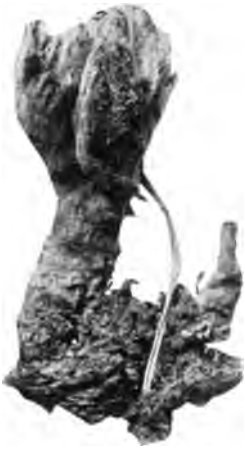

Fig. 458

Spongiosus distortus.

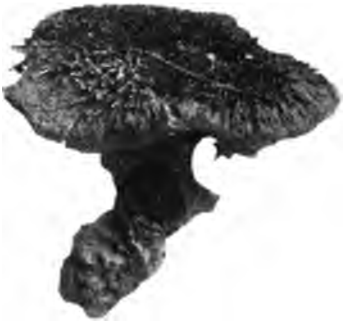

Fig. 459

Spongiosus hystriculus.

34. CONTEXT DEEPLY COLORED. SPORES SUPPOSED TO BE WHITE.

SCHWEINITZII.—Pileus dark brown covered with matted tomentum. Context brown, soft, spongy when fresh, brittle when dry. Stipe usually short and thick, rarely central, usually excentric, sometimes wanting. Pores large at first, meruloid, shallow, becoming longer, irregular and often lacerate when old. Spores white in mass, elliptical 4 x 6, hyaline, smooth. A frequent plant in both Europe and the United States, but growing usually in pine woods. Sometimes quite large, one to two feet in diameter.

REPSOLDI.—Described from Brazil as growing on trunks and having a "gigantic" stem. Spores 5 x 7, hyaline. Not found by me at Berlin, but the description is close to Schweinitzii except the pores are *minute*.

PACHYPUS.—Known only from unsatisfactory specimens in the Herbarium of Montagne. It came from Cuba and seems to me to be closely related to Schweinitzii.

35. CONTEXT DEEPLY COLORED. SPORES COLORED BUT OFTEN BUT FAINTLY.

a. WITH COLORED SETAE ON THE HYMENIUM.

CIRCINATUS.—Context thick, spongy, deeply colored. Stipe mesopodal in the type form, usually pleuropodal. Setae curved.

Spores pale color, 7 x 12 (or 3 x 5 in the American plant). The type form which is mesopodal is only known in Europe from Fries' Icones t. 3. The pleuropodal form occurs but is also rare. In the United States the mesopodal form is not rare in New England and the pleuropodal form is still more common.

TOMENTOSUS.—Same as the preceding plant but thin, the upper, spongy context layer being very slightly developed. Same color and setae. Frequent in the pine woods of Sweden. If it occurs in central Europe it is rare, and it is unknown from the United States.

The following two are not stipitate, but we mention them here on account of their evident close relationship to the preceding.

TRIQUETER.—In the sense of Fries (?) and Romell, a thick, sessile form of circinatus. Same context, color, and setae. It is rare in Europe. In the original sense of Persoon it is in my opinion the same as cuticularis.

LEPORINUS.—A thin, dimidiate form of the same plant. Rare in Europe and the United States.

b. SETAE NONE.

SIDEROIDES.—Context ferruginous, spongy. Spores abundant, colored, globose, 8-9 mic. Stipe in the type form thick, pleuropodal, spongy. This species is represented at Leiden by several collections from Java, but not in other museums (except one cotype at Kew). The most perfect forms have a general resemblance in color and shape to Polyporus Schweinitzii. Thin forms occur with lateral stipes, and the type of Polyporus Korthalsii, at Leiden, appears to be a sessile form.

PUIGGARIANUS.—Context spongy, soft, brown. Spores abundant, *conidial,* globose, minutely rough. According to the collector's notes a large, infundibuliform species. Known from a piece of the pileus at Berlin, from Brazil.

ALBERTINII (Fig. 460).—Pileus mesopodal, with thick, obese stem. Surface and context, pores and stem concolorous, ferruginous. Context soft, spongy with large, inflated hyphae. Pores large, angular, decurrent on the stem. Setae none. Spores abundant, colored, 6 x 8, smooth. Specimen at Kew from Endeavor River, Australia, referred by Cooke to Schweinitzii, which it closely resembles in general appearance. Named for Albertini, who was the tutor of Schweinitz.

MONTAGNEI.—Pileus obese, ferruginous, with uneven surface. Pores concolorous, medium large, decurrent. Spores 8 x 10, pale colored, smooth. Setae none. Rare in both the United States and Europe. This plant is usually placed in the next section, but is rather obese for the allied plants of that section.

FRAGILISSIMUS.—Context soft, spongy, cinnamon-ferruginous. Pores concolorous. Spores 3-4 x 4-5, deeply colored, smooth. Stipe mesopodal. Known only from pieces of the pileus in the herbarium of Montagne from French Guiana.

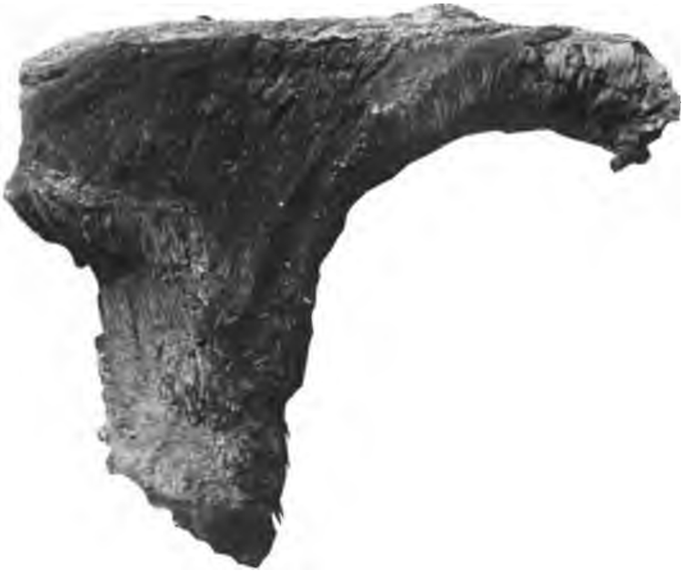

Fig. 460

Spongiosus Albertinii.

SUB-BULBIPES.—Imperfectly known from a half specimen at Berlin from Brazil. It has a soft, spongy context and I judge from my photograph a thin crust. Spores I did not find, but Hennings records them as globose, 3½-4, light yellow. The plant may belong in Section 5 of Amaurodermus.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

abortivus, United States, Peck=distortus.

acanthoides, Europe. In the sense of Fries=rufescens. In the sense of Bulliard=poor picture of giganteus.

benquetensis, Philippines, Murrill=circinatus. (?)

biennis, Europe, Bulliard=rufescens. Often called Daedalea biennis.

conglobatus, Europe, Karsten. Unknown to me, but the description reads much like distortus.

dualis, United States, Peck. (Also Polyp. Issue, p. 4)=leporinus of Europe.

hispidoides, United States, Peck=Schweinitzii.

holophaeus, Europe, Montagne=Schweinitzii.

Kalchbrenneri, Europe, Fries. Based on small specimen of tomentosus now labeled perennis through error of R. Fries.

Korthalsii, Java, Léveillé. The type specimen appears to be a sessile form of Polyporus sideroides, same spores, context, texture, and color. In other namings of Léveillé (viz., Zoll. 872) it is Fomes Harkarlii, which has no relations whatever to the type at Leiden.

maximus, Europe, Brotero. No one knows and no one doubts but that it equals Schweinitzii.

Memmingeri, United States, Murrill. Unknown to me. Seems close to Montagnei.

obesus, United States, Ellis (also Polyp. Issue, p. 11)=Montagnei.

occultus, Europe, Lasch. I judge from the little co-type frustule I have seen (Rabh. Exsic. 617) that it is rufescens.

platyporus, India, Berkeley. Type very scanty and inadequate but=I think rufescens, form heteroporus.

proteiporus, Australia, Cooke=rufescens.

Sahranpurennis, India, Hennings. Not found by me at Berlin, but from description seems to be Schweinitzii.

scutiger, Europe, Kalchbrenner. Changed by Fries to Kalchbrenneri and based on small specimens of tomentosus.

sericellus, Europe, Saccardo=rufescens, form heteroporus.

Sistotrema, an old synonym for Schweinitzii, often used as a juggle.

spectabilis, United States, Fries=Schweinitzii.

spongia, Europe, Fries=Schweinitzii. The only type is at Kew.

tabulaeformis, United States, Berkeley=Schweinitzii.

tubulaeformis, United States, Saccardo, misprint for tabulaeformis.

SECTION PELLOPORUS.

Context dry, ferruginous, or yellowish brown with deeply colored hyphae. Setae rare. Pores concolorous. Spores colored, pale in most species. Plants growing in the ground and usually concolorous. Rarely epixylous. This section is practically the same as the section Perennes of Fries, but we do not use the name as it is misleading for the plants are not perennial.

36. PELLOPORUS POLYPORUS. CONTEXT FLESHY, TOUGH, RATHER BRITTLE, MOSTLY MORE OBESE THAN THE NEXT SECTION.

INDICUS (Fig. 461).—Pileus rugulose, dark brown, zonate. Flesh 5 mm. thick, pale rhubarb color. Hyphae deep yellow. Stipe mesopodal, subligneous, irregular. Pores small, round, 5-8 mm. long, darker than the context with pale mouths. Spores abundant, globose, 5 mic., smooth, deeply colored, mostly guttulate. Known from specimen sent me by B. S. Cavanagh, Baroda, India.

CUMINGII.—Context thin. Pores minute, 2 mm. long, concolorous. Stipe slightly spongy. Spores 3-3½, pale colored. Plant mesopodal. Only known from types at Kew from Philippines (also Mexico?).

VALLATUS (Berkeley).—Context thick, subligneous, bright color. Surface dull, concolorous. Pores small. Known from two specimens at Kew from India. One seems pleuropodal, the other mesopodal.

The two following are much smaller than those that precede, but the rigid, brittle flesh more closely allies them than to the next section.

LUTEO-NITIDUS (Fig. 462).—Pileus irregular, mesopodal or pleuropodal. Stipe slightly spongy, often long rooting. Context thin. Pores minute. Very similar but a larger species than the next. Seems frequent in tropical South America.

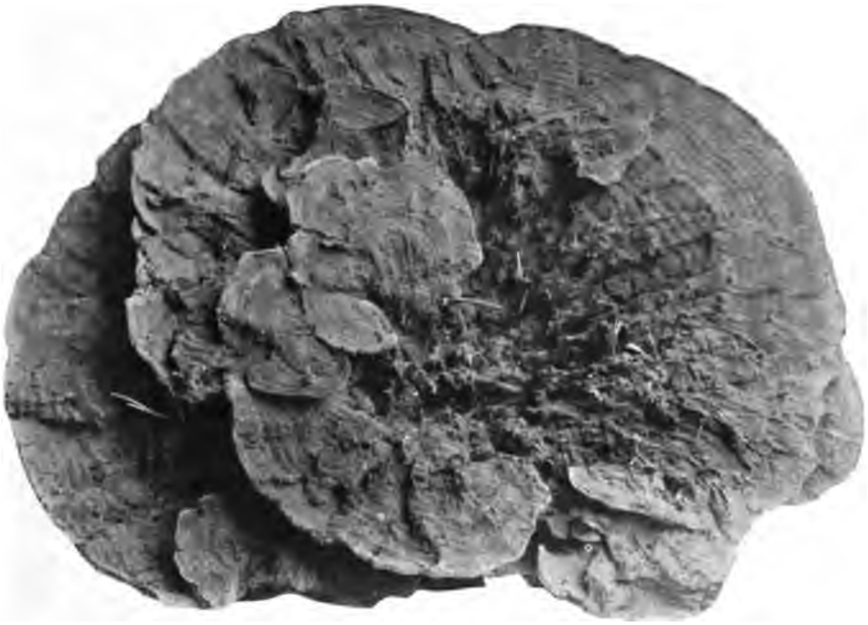

Fig. 461

Pelloporus indicus. (Top of pileus). Reduced

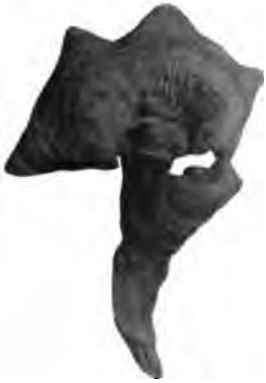

Fig. 462

Pelloporus luteo-nitidus.

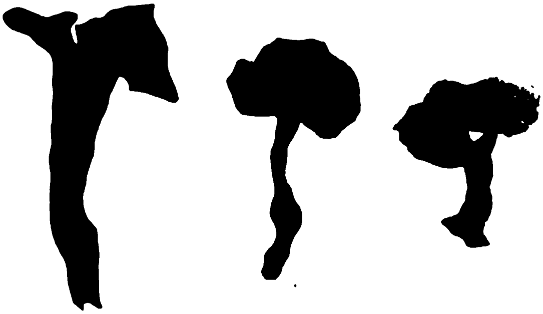

Fig. 463

Pelloporus multiformis.

MULTIFORMIS (Fig. 463).—Stipe lateral, rooting. Pileus flabelliform, thin. Surface striate. Spores 3 x 4, colored. Very similar in color and habits to preceding and in the same region. It is smaller and not disposed to take mesopodal forms. Known from three collections all at Paris. It may be only small forms of the previous.

37. PELLOPORUS POLYSTICTUS. CONTEXT THIN, FLEXIBLE.

Small plants growing in the ground with mesopodal stems. This is the old section Perennes of Fries.

a. COLOR DULL CINNAMON.

PERENNIS.—The most frequent species of the section in both Europe and the United States. Known from its dull, zonate, cinnamon color. Pores small. Spores 4-5 x 8-10, pale colored.

FOCICOLA.—Very similar to the preceding species but with larger pores(1 mm. or more). Frequent in the *southern* United States and there replaces the perennis of the northern states. Unknown from Europe.

DECURRENS.—A rare plant if not a form, based on one collection, from Massachusetts (Cfr. Pol. Issue, p. 12).

PICTUS.—It is a little, slender species known only from specimen in the Herbarium of Fries. It has very thin context, ½ mm., pores 2 mm. long, and the color now is black. Distinct but rare. Spores 6 x 8. The reference Bulliard No. 254 is an error as also are the French records of this plant.

b. COLOR BRIGHT, FERRUGINOUS CINNAMON.

CINNAMOMEUS.—A uniformly bright colored plant with silky, shining, appressed, radiating fibrils. Very rare in Europe, more frequent in the United States. Pores small. Spores 5-6 x 7-10, pale colored under the microscope. The forms from Ceylon and India are otherwise the same but have more globose spores, 6-7 x 8.

OBLECTANS.—The Australian plant (and it is evidently very common in Australia) differs from the European in having usually larger pores and more erect fibrils on the pileus. Spores are 5 x 8, pale. The color is the same and the plants have been held to be the same, but I feel that the Australian plant is entitled to a name.

OBLECTABILIS (Fig. 464).—This, which is based on specimens collected in Brazil, distributed by Ule (No. 48) has been referred to oblectans of Australia. It is similar in color but is more slender, has larger, more shallow pores. The margin is thin and fimbriate and the spores more narrow and more pointed. The spores are 4 x 10, pale colored and tapering at one end.

OBLIVIONIS (Fig. 465).—Entire plant unicolor, of a bright cinnamon color. Pileus soft, subzonate, appressed, fibrillose. Context thin, less than 1 mm. Pores minute, 2 mm. deep. Stipe slender, 3-4 mm. thick, soft tomentose, 7 to 10 cm. long. Spores abundant, elliptical, 7-8 x 10-12 mic., colored. This is a beautiful species known from one collection at Kew from Brazil. It is much larger than any other brightly colored species of this section.

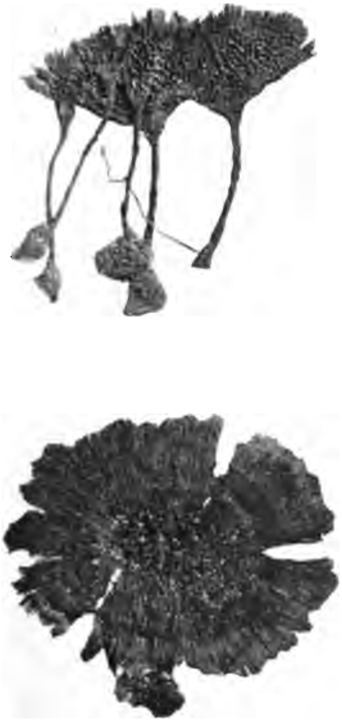

Fig. 464

Pelloporus oblectabilis.

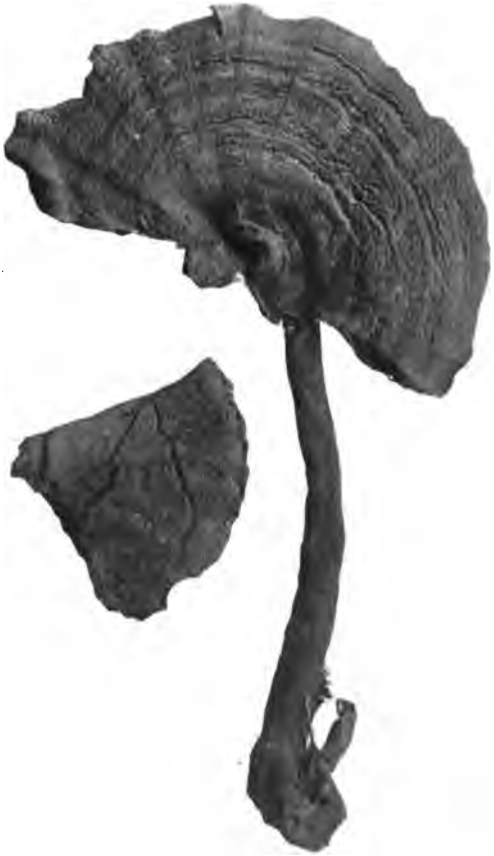

Fig. 465

Pelloporus oblivionis.

CUTICULARIS.—Pileus very thin with large, long pores, and was published in Pol. Issue page 11, and has since been received from the same locality. It is a very rare species of the New England States. It is badly named as it is liable to be confused with Polyporus cuticularis, to which it has no resemblance.

DEPENDENS.—A most curious little species which hangs pendant from the under side of logs somewhat in the manner of a wasp's nest. Entire plant bright cinnamon color. Spores colored, 5 x 7. It is very rare in the United States.

See Polyporous hamatus, Addenda, p. 195.

(Polyporus Montagnei, see Section 35, is a thicker, more obese plant than others of this section, but its relations are undoubtedly closer here than where we have placed it.)

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

bulbipes, Australia, Fries. No type exists=oblectans, teste Fries, but he claimed to have named it in manuscript first.

carbonarius, Europe, Fries. Based on an old picture (Micheli) and unknown. Said to have white pores, hence can not belong in this section.

Cladonia, Australia, Berkeley. Types very young=oblectans, young, I think.

connatus, United States, Schweinitz=perennis.

connatus, United States, most writers,=focicola.

Ehrenreichii, Brazil, Hennings. Type inadequate.

Euphorbiae, China, Patouillard. Unknown to me.

fimbriatus, Europe, Bulliard=perennis.

parvulus, British Columbia, Klotzsch=cinnamomeus.

parvulus, United States, most authors=focicola.

perdurans, Tasmania, Kalchbrenner. Nothing authentic has been seen by me, but the determinations at Berlin are oblectans.

peronatus, Europe, Schulzer. Only known from a drawing, showing a volva (sic) surely inaccurate.

proliferus, United States, Lloyd. Something abnormal.

Salpincta, New Zealand, Cooke. Types inadequate. Probably an abnormal oblectans. The illustration in the Handbook is largely made up.

saxatilis, Europe, Britzelmayr. It is purely a waste of time to bother with his work.

scutellatus, Siberia, Borszczow. Seems from the description to be focicola which, however, is not known excepting in America.

scutiger, Europe, Kalchbrenner. Changed by Fries to Kalchbrenneri. It was based on a small specimen of tomentosus.

simillimus, United States, Peck. At best a form of perennis, but it is not possible to maintain it even as a form.

spathulatus, South America, Hooker. Type in two little fragments. It is probably the same as multiformis.

splendens, United States, Peck=cinnamomeus.

subsericeus, United States, Peck=cinnamomeus.

Verae-crucis, Mexico, Cooke. Known from but one collection from Mexico which I think on comparison is the same as Polyporus Cumingii, known only from the Philippines.

SECTION OVINUS.

In the section Ovinus we give very scanty accounts, as the section has been recently considered and illustrated in full by us in a separate pamphlet. Ovinus embraces the thick, fleshy species of Polyporus with mesopodal or pleuropodal or rarely lateral stems.

38. WITH SCLEROTIUM.

TUBERASTER.—Sclerotium (false) of earth, agglutinate with mycelium. Pores small, white. In Italy, Switzerland.

GOETZII.—Sclerotium small, 2-3 inches. Plant mesopodal. Known from one specimen at Berlin from Africa.

SAPUREMA.—Sclerotium large, bearing several plants. Speci-n in alcohol at Berlin from Brazil.

MYLITTAE.—Sclerotium, the well known "native bread" of Australia. In the museums I have visited there are no specimens with the fruit, but a photograph of a sclerotium with the Polyporus is at the British Museum.

39. STIPE USUALLY MESOPODAL. PORES SMALL.

OVINUS.—White. Pores small. Spores 3½-4. Common in Sweden and is also found in Alpine regions of central Europe. Its record in the United States is not certain.

LEUCOMELAS.—Pileus fuliginous. Pores pale. Spores tubercular. Rare in Europe. Not known from the United States.

GRISEUS.—Pileus and pores smoky gray. Spores tubercular. Frequent in the United States. Rare in Europe.

CAERULIPORUS.—Pileus and pores bright blue when in prime. Brown when dry. Very rare in the United States.

POLITUS.—Color dark reddish. Very rare in Europe. Only known from Fries' Icones and a specimen at Kew. Possibly it is a small mesopodial form of confluens.

Peckianus, cfr. Lentus, p. 171.

40. STIPE CENTRAL. PORES LARGE.

(Compare tuberaster in 38.)

41. STIPE USUALLY EXCENTRIC OR IRREGULAR. PORES SMALL.

CRISTATUS.—Color greenish yellow. Frequent in the United States. Rare in Europe.

CONFLUENS.—Color pale reddish, becoming deeper red in drying. Often confluent and irregular. Frequent in Europe and eastern United States.

DISCOIDEUS.—White, becoming isabelline in drying. Grows on logs. Brazil and the type from Cuba.

POPANOIDES.—White or yellowish when dry. No distinct cuticle. With short, thick stipe near one side. Known only from one collection from Mauritius at Kew.

42. STIPE EXCENTRIC. PORES LARGE.

PES CAPRAE.—Surface with small, fasciculate scales. Alpine regions and southern Europe. Very rare in the United States.

ELLISII.—Pale yellow with large floccose scales. Very rare in the southern United States.

SQUAMATUS.—With large scales. Dark reddish when dry. Known from one collection from Hungary at Berlin.

(Cfr. Boucheanus in next section.)

43. MELANOPUS. PORES LARGE.

SQUAMOSUS.—Pileus scaly. Pores favoloid. Stipes usually excentric. Common in Europe, rare in the United States.

ROSTKOVII.—Smooth form of squamosus. Rare in Europe and the United States.

BOUCHEANUS.—Small, smoothish form of squamosus with uncolored stipes. Rare in Europe.

LENTINOIDES.—Tropical, smooth form of squamosus.

TUMULOSUS.—Pileus with a smooth, thin cuticle, recalling betulinus. Stipe short, central. Supposed to form large, mycelial masses. Known from the type at Kew from Australia.

TASMANICUS.—Pileus turbinate. Stipe short. Known from one collection from Tasmania at Kew.

44. MELANOPUS. PORES SMALL.

RADICATUS (Fig. 465 bis.).—Mesopodal with a long, rooting base. Not rare in the United States.

HARTMANNI.—Brown, velutinate, with short, thick, excentric stipe. Two collections from Australia at Kew.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

alpinus, Europe, Sauter. From the description seems to be Rostkowii.
asprellus, Europe, Léveillé. Based on a crude figure of Pes caprae.
bulbipes, Europe, Beck. Known only from an illustration and is probably the same as Boucheanus. Spores seem a little different, but that is all.
cadaverinus, Europe, Schulzer. Some abnormality.
Campbelli, India, Berkeley. Type is inadequate.
caudicinus. A cheap juggle of Polyporus squamosus. It originated in Europe, but has been copied in the United States.
Clusianus, Europe, Britzelmayr. Unknowable.
decurrens, United States, Underwood. Unknown.
Earlei, United States, Underwood=griseus.
flavo-squamosus, United States, Underwood=Ellisii.
flavo-virens, United States, Berkeley=cristatus.
Forquignoni, Europe, Quélet=Boucheanus.
fuligineus, Europe, Fries. Unknown, based on an old figure.
holocyaneus, United States, Atkinson=caeruliporus.
Kansensis, United States, Ellis. Not seen by me, but is probably Polyporus melanopus.

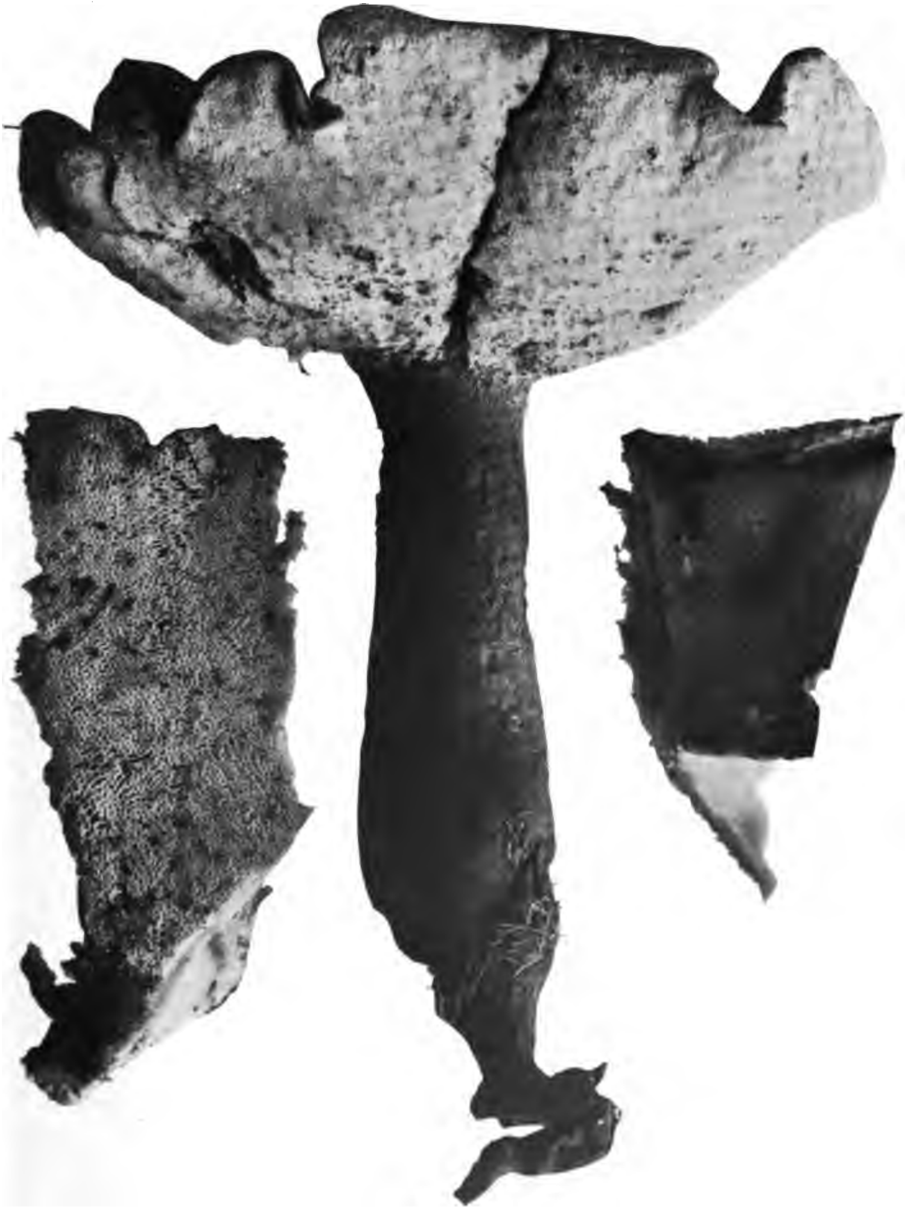

Fig. 465 bis.

Ovinus radicatus (reduced about one-fourth). Pore details natural size.

laeticolor, United States, Murrill. Preoccupied. Changed to luteo-luteus by McGinty.

luteo-luteus, United States, McGinty. Unknown to me.

Michelii, Europe, Fries. Unknown, based on an old figure.

Morganii, United States, Peck=radicatus.

myclodes, Australia, Kalchbrenner. Unknown.

nodipes, India, Berkeley. No type exists.

novo-guineensis, New Guinea, Hennings. Nondescript.

olivaceo-fuscus, Ceylon, Berkeley. Type consists of two sections from which nothing can be told. It is probably a young Boletus.

pallidus, Europe, Schulzer=squamosus with small scales.

poripes, United States, Fries. Unknown. No type exists.

pseudoboletus, South America, Spegazzini. Unknown.

punctiporus, Europe, Britzelmayr. All of his species are unrecognizable.

retipes, United States, Underwood=Pes caprae.

Schweinfurthianus, Africa, Hennings. Not a Polyporus but a Boletus.

scobinaceus, Europe. Used as a juggle for tuberaster.

subradicatus, United States, Murrill. Probably=radicatus, which the author does not seem to know very well.

subsquamosus, Europe, Linnaeus. Unknown. Probably=griseus.

tessulatus, Europe, Fries. Unknown. Based on an old picture.

violaceo-maculatus, China, Patouillard. Unknown to me.

virellus, Europe, Fries. Based on picture=cristatus sans doubt.

viscosus, Europe, Persoon. Not a Polyporus but a Boletus.

Whiteae, United States, Murrill. Unknown to me.

xoilopus, Europe, Rostkovius. Unknown except from a doubtful picture.

SECTION LENTUS.

This section generally has mesopodial stipes. They are thinner, more pliant, or coriaceous than the section Ovinus. Also they are mostly epixylous in habitat. All as far as known have pale context hyphae and white spores.

45. LENTUS. PORES SMALL.

a. WHITE.

TRICHOLOMA (Fig. 466).—White, strongly marked with ciliate hairs on the margin when young, but they are detersive. Pileus depressed in the center. Spores 4 x 6, hyaline, smooth. Frequent in tropical America.

CRYPTOPUS (Fig. 467).—Growing attached to grass stems in western United States. Similar to rhizophilus of Tunis, but has smaller pores and spores.

CORYLINUS.—Only known from illustration (Viv. t. 1) from Italy, but seems very distinct.

LEPTOCEPHALUS.—Only known from an old illustration (Jacq. Misc. 1, t. 12) but seems quite characteristic. In short, it is elegans *without* a black stipe.

(albiceps, see page 180. Specimens with uncolored stems would be sought here.)

b. GRAYISH OR FULIGINOUS BROWN.

BRUMALIS.—Stipe and pileus fuliginous. Pores small but elongated, white. Common both in Europe and the United States, on branches, late in the season.

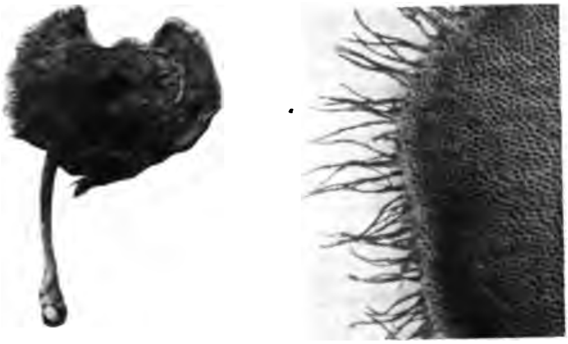

Fig. 466

Lentus tricholoma. With section enlarged, showing marginal hairs.

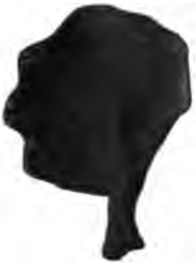

Fig. 467

Lentus cryptopus.

CILIATUS.—Very close to brumalis but lighter color and more slender and grows often attached to buried sticks. It is rare in Europe.

LEPIDEUS.—Close to brumalis but of a different color, pale yellowish, fuliginous. Very rare in Europe, known only on birch.

SCABRICEPS.—Known from one specimen at Kew from Cuba. Close to brumalis but has more scabrous pileus. Still it is not well named.

GUARANITICUS.—Close to brumalis as to shape and size. Close to lepideus as to color, but the pores are small and *round.*

VERNALIS.—Close to brumalis but more slender and yellowish. Rare in Europe and only known to me from the figure by Quélet.

UMBILICATUS.—Close to brumalis but more smooth and *rigid.* Known from the type at Kew from India. I have also a specimen from India from Rev. Theissen.

c. COLOR YELLOW OR REDDISH BROWN.

FUSCIDULUS.—Rare, and the only collection known is in Cooke's herbarium and was collected in England. Figured by Bolton (t. 170). When fresh seems to have white flesh and *yellow* pores.

PECKIANUS.—Pileus thin, infundibuliform, with a central stem. Pale yellow when fresh as are the small pores. Grows in the ground, hence might be sought in Ovinus, but is too thin for that section.

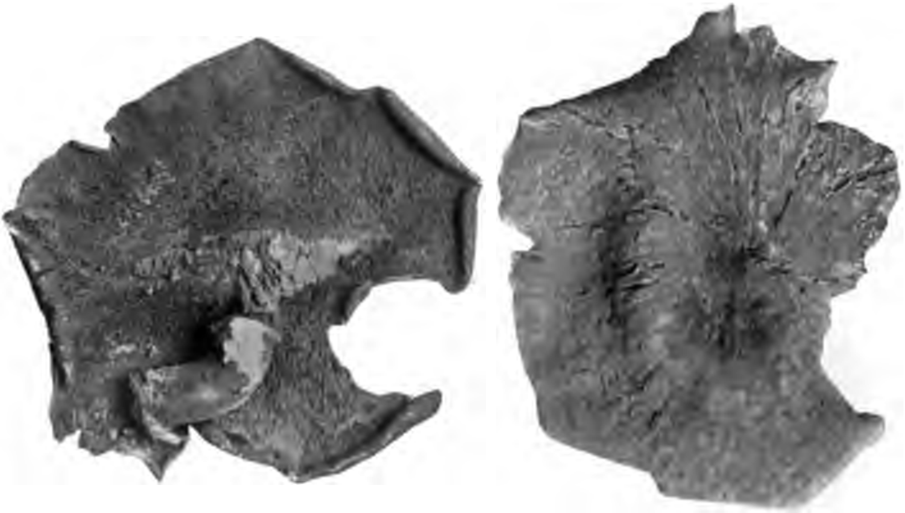

Fig. 468

Lentus virgatus

VIRGATUS (Fig. 468).—Known from one abundant collection from Cuba. The type is at Kew. Pileus of peculiar reddish brown color and appressed fibrils. Context and pores also reddish brown.

SUBVIRGATUS.—A plant of India very close to virgatus of the American tropics as to color, shape, and size, but is devoid of the virgate fibrils and the pores are not at all irregular.

IRINUS.—Known to me only from the figure (Bull. Myc. France, 1888, t. XII). Seems to be a reddish plant with a zonate pileus.

REPANDO-LOBATUS.—Specimen at Paris which is very close to virgatus and endorsed by Patouillard on the label as same, but which seems to me to be a little different.

Unknown to me Except from Description.

Guarapiensis, South America.
pauperculus, South America.
tucumanensis, South America.
fuegianus, South America.
Braziliensis, South America.
dictyoporus, West Indies.
depressus, South America.

d. MICROPORUS. THIN, RIGID WITH MINUTE, WHITE PORES IN A VERY THIN LAYER. COLOR REDDISH BAY OR SIENNA BROWN.

A natural section (or perhaps one species) which runs also to forms with lateral stems (Cfr. page 142). (See also Synopsis of Microporus section published, 1910.)

XANTHOPUS (Fig. 469).—Stipe smooth, yellow. Pileus smooth. A very common species, particularly in Africa, but it occurs also in the East in general. It seems to be absent from the American tropics.

FLORIDEUS.—At best only a dark form of xanthopus with a short stipe.

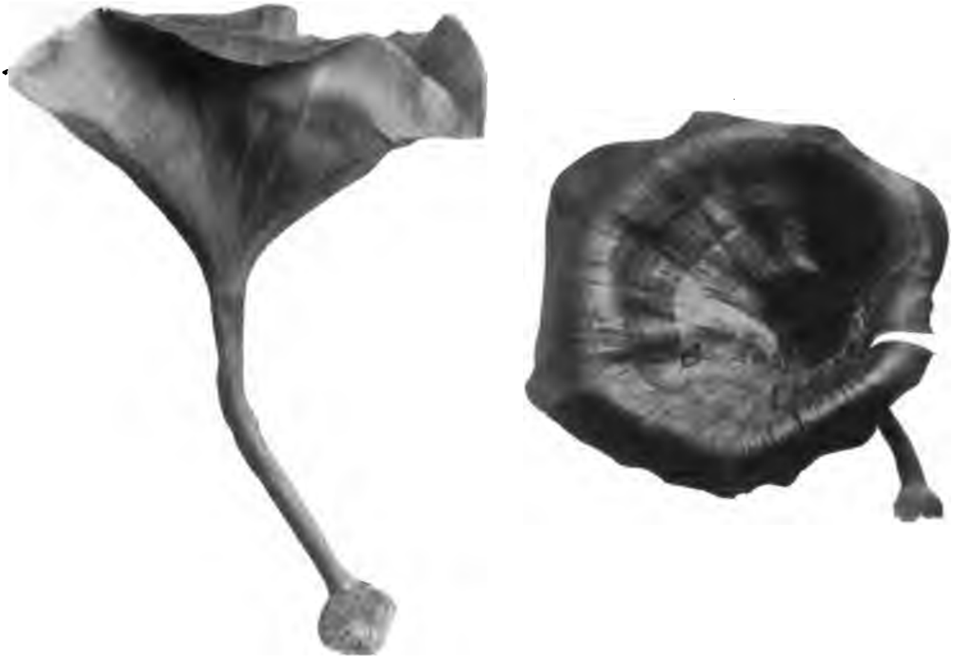

Fig. 469

Lentus xanthopus.

CONCINNUS.—Stem slender, black. Pileus covered with a uniform, fine, downy, velvety pubescence. This is a rare form in Africa.

INCOMPTUS.—Stem dark or black. Pileus with pubescent zones. This appears to be a common form in Africa and is frequently sent to Europe with xanthopus. However, I believe they are distinct. It was included in my Synopsis under the name Holstii.

PSEUDO-PERENNIS.—Stipe dark or black. Pileus densely covered with appressed pubescence, faintly zoned, with narrow, glabrous zones. Known from a single collection at Berlin from Africa. Though the plant has no relations, it has a general resemblance to Polystictus perennis.

46. PORES LARGE.

Some of these might be placed in Favolus to probably better classification.

a. WHITE.

FAVOLOIDES (Fig. 470).—Known only from one specimen from Africa, in alcohol at Berlin. A very marked species with thin, white, umbilicate pileus, long, slender stem, and large, white, favoloid pores.

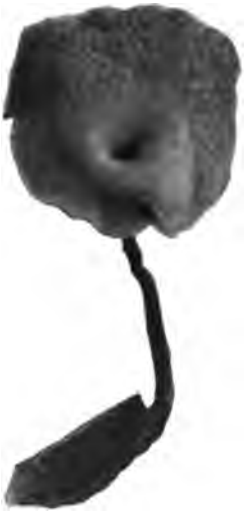

Fig. 470

Lentus favoloides.

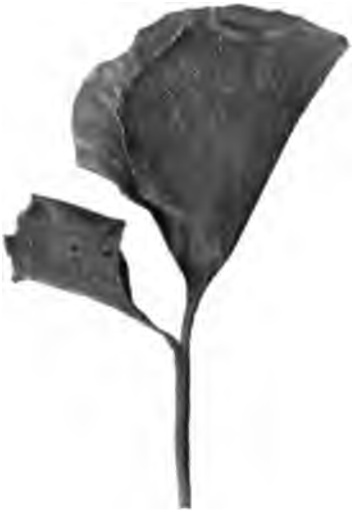

Fig. 471

Lentus partitus.

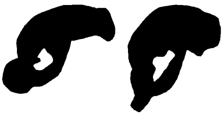

Fig. 472

Lentus nanus.

NANUS (Fig. 472).—Known from one collection from Algeria at Paris. A little species growing in the sand. Spores are globose, 4-5, hyaline, smooth. Color seems to me to have been white though described as pale yellowish.

RHIZOPHILUS.—Collected by Patouillard. Common in Tunis, attached to grass culms. Very similar to cryptopus of the United States but has larger pores and spores.

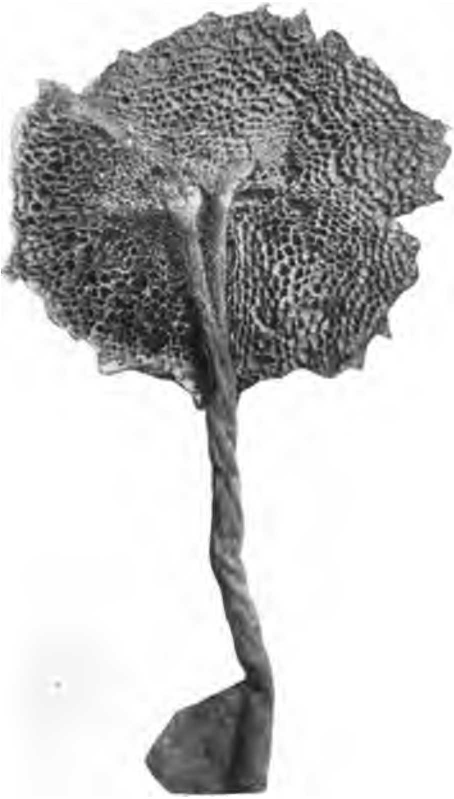

Fig. 473
Lentus Marmellosensis.

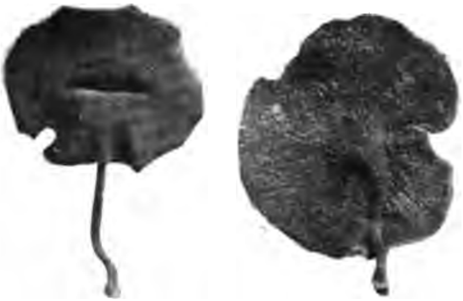

Fig 475
Lentus ciliatus (bis).

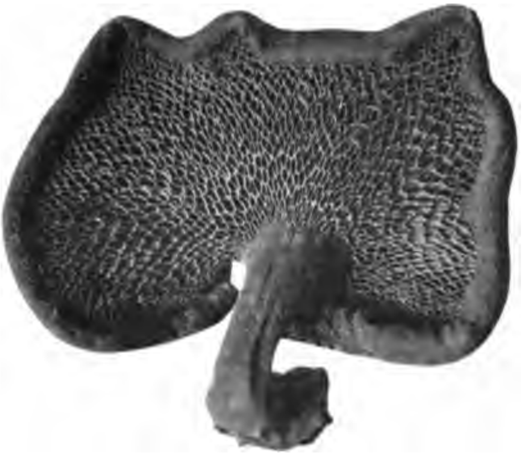

Fig. 474
Lentus orbicularis.

PARTITUS (Fig. 471).—Pileus thin, mesopodal and usually more or less parted or lobed, reddish brown, rigid. Pores thin, large, shallow with thin walls, white. Stipe mesopodal, lateral from the imperfect formation of the pileus, slender, dull, dark surface. Known from several collections from Spruce, Brazil, at Kew, also one collection at Berlin.

b. COLOR BRIGHT YELLOW.

TILIAE.—Known only from Icones, Kalchbrenner, t. 38. All parts of the plant are bright yellow. Very peculiar if correctly depicted, but probably an exaggeration or imagination of some kind, as the author was much given to drawing imaginary pictures. No such plant is now known in Europe.

c. COLOR BROWN OR BROWNISH.

ARCULARIUS.—Pores large, favoloid, white. Pileus brownish, often infundibulform, more or less scaly. A widely distributed plant in most countries of the world. In the United States it is common in the spring. In Europe it is of a southern range only. Frequent in the tropics.

SPECIES WHICH ARE CLOSE IF NOT THE SAME AS ARCULARIUS.

squamiger (as Favolus), Australia.
cremoricolor, India.
aemulans, Cuba.
maculatus, India.
tunetanus Algeria. Placed in Melanopus, but I think belongs here.
arculariellus, United States. The late summer form of arcularius.
arculariformis, United States.

CILIARIS (as Favolus) (Fig. 475).—This plant occurs in tropical America and is very close to Polyporus tricholoma but *with much larger pores* and close to Polyporus arcularius, but *with smaller pores.* It was distributed by Ule as a variety of Polyporus tricholoma.

ORBICULARIS (Fig. 474).—Known to me from one collection at Berlin made in that vicinity, referred by Hennings to Boucheanus but surely not that. It has a sublateral stipe and large, favoloid pores. It seems to answer the description, but of course that is only a guess.

LENTUS.—Very much the same as arcularius excepting its color which is paler and the plant is more tough. Formerly collected, apparently in abundance, on old stems of gorse (Ulex) in England, but not in recent years. Recorded in error from the United States.

MARMELLOSENSIS (Fig. 473).—Known from but one specimen from Brazil at Berlin, which is most peculiar. Thin, dark, reddish brown with *large,* white, *round* pores. So thin it might be sought in Polystictus or really in Hexagona from its pore shapes. It is the only similar plant known.

(Boucheanus, see Ovinus, page 168, probably better classed here.)

LENTUS SPECIES UNKNOWN TO ME AND NOT FIGURED.

Incendiarius.—Smooth, white, said to be "copious" in Russia, but unknown in the museums of Europe.
Penningtonia. South America.
Velutipes, China. Said to have a viscid pileus and contorted pores.
Fagicola, United States. Known only from the type locality.
Variiporus, West Indies. Said to resemble Tricholoma, but has large pores.

47. LENTUS. SUBGELATINOUS WHEN FRESH (TENDING TOWARD LASCHIA.)

GRACILIS.—Smooth, reddish brown, small pores, with smooth, reddish stem. When fresh it is subgelatinous. Several collections are known, all from tropical America. Original at Kew from the West Indies. The color of the dried specimens is reddish brown, but we suspect that when fresh it is white.

FORM.—We have from Rev. Rick of Brazil a collection which we think is the same species as the preceding but with notably larger pores.

48. LENTUS. ABERRANT SPECIES AS TO SHAPE. INFUNDIBULIFORM, GIBBOUS, OR VERY MINUTE.

CRATERELLUS.—Infundibuliform, brown now, described as white or yellow, and it may have been white. Spores abundant, 4 x 5, hyaline, smooth. Only known from original collection at Kew from Cuba.

CONFUSUS (Fig. 476).—In shape, size, and color apparently the same as the preceding and so originally determined. Spores 3-4 x 12-14. Known from a collection from Louisiana, sent by Ellis to Kew.

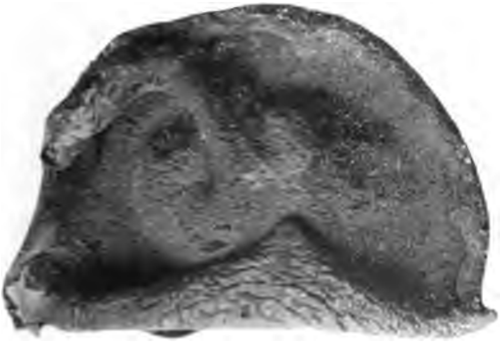

Fig. 476

Lentus confusus.

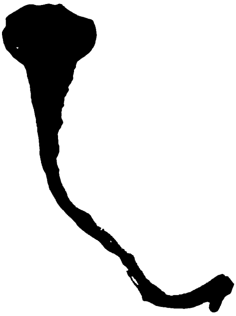

Fig. 477

Lentus Tuba.

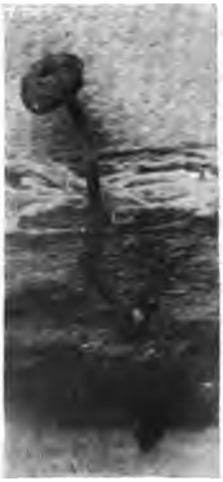

Fig. 478

Lentus acicula (enlarged six times).

TUBA (Fig. 477).—Peculiar, gibbous shape which has been inaccurately described as cup-shaped. Known only from the original collection at Kew from Cuba.

ACICULA (Fig. 478).—If it is a Polyporus, and I can not say it is not, it is unique in its small size, not much larger than a pin head and known from a single specimen from Cuba at Kew.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

agriceus, Ceylon, Berkeley=arcularius as Berkeley himself referred.

alveolarius, United States, Bosc. Figure is a crude representation of arcularius.

apalus, Brazil, Berkeley=gracilis.

Armitii, Australia, Cooke. No type exists. It was figured in Grevillea but I do not know as to its accuracy. Referred afterwards to stipitarius, but that surely was an error if the figure at all represents it.

bataviensis, Java, Holtermann. From the figure I judge it is Laschia caespitosa.

Binnendykei, Java, Cooke. No specimen exists. Based on an old drawing, probably pale arcularius.

cachoeriacensis, Brazil, Hennings=partitus.

callochrous, Léveillé. Neither specimen nor locality known.

clypeatus, South America, Patouillard (as Laschia)=gracilis.

collybioides, Australia, Kalchbrenner. Type inadequate.

Columbiensis, United States, Berkeley. Oregon, not South Carolina as inaccurately compiled by Mr. Murrill. The type is a little discolored frustule that tells nothing and which should never have been named.

conspicabilis, Europe, Britzelmayr. Not worth the trouble of bothering with his crude cartoons.

Cowelli, West Indies, Murrill. From the description I judge it is the same as gracilis, which the author does not seem to know although there is a good type at Kew.

crassipes, India, Curry=xanthopus.

cupreo-nitens, Australia, Kalchbrenner=xanthopus.

Curtisii, United States, Berkeley (as Favolus), a late form of arcularius, changed to arculariellus by Murrill.

cyathiformis, Léveillé, West Indies. No type exists. Probably the same as Polyporus craterellus.

dibaphrus, United States, Berkeley=brumalis.

esculentus, Europe, Britzelmayr. Cartoon.

favularis, East Indies, Fries. No type exists.

flavidus (bis), United States, Peck. Changed to Peckianus.

flexipes, Brazil, Fries. No type exists. Supposed by Fries to be the same as gracilis, but I have little doubt it was the same as Polyporus Tricholoma.

floccopus, Europe, Rostkovius. Seems from the crude picture to be the same as lentus.

fuligineo-albus, Europe, Trog. Unknown to me.

hapalus, Brazil, Saccardo. A variant spelling of apalus.

Humphreyi, West Indies, Hennings. No specimen in the cover at Berlin, but said by Murrill to be the same as Polyporus Tricholoma. Whether he saw it or merely guessed at it he does not state.

Katui, Marshall Island, Ehrenberg=xanthopus. It was finely illustrated under the name Katui and on its merits this name should be used.

luridus, United States, Berkeley=brumalis.

meizoporus, Cuba, Berkeley (in Saccardo as a variety of stipitarius). I find no type.

melanocephalus, Japan, Patouillard. Type small and inadequate. Probably discolored by alcohol.

Mildbachii (Mss. at Berlin), Africa,=concinnus.

mycenoides, New Caledonia, Patouillard=Laschia caespitosa.

obolus, Central America, Ellis. I have not seen this, but the description indicates gracilis.

obscura, China, Kalchbrenner. Unknown. Probably arcularius.

paraguayensis, South America, Spegazzini. Same as guarapiensis, but more pleuropodal.

Perula, Africa, Palisot. Picture probably represents deformed specimen of xanthopus.

phaeoxanthus, United States, Montagne. Type is a mere frustule (cfr. Myc. Notes, p. 492).

pisiformis, Australia, Kalchbrenner. "Type" is a little incipient sessile, undeveloped pad, about the size and appearance of a wart. Should never have been named at all and most certainly should never have been put in the section Lentus of *stipitate* fungi where Cooke placed it.

planus, Europe, Wallroth. Unknown. As it grew in the ground it may not belong to the section Lentus.

platensis, South America, Spegazzini. Unknown.

Polyporus Polyporus. This gibberish sounds to me more like the college yell of the Carlisle Indians than "Latin," but is alleged to be a Latin name for Polyporus brumalis. I doubt if a Roman barmaid would have been guilty of employing such silly language, and yet men who claim to be "scientific" have the assurance to go into print with such names under the pretext that they are employing Latin.

Puiggarii, Brazil, Spegazzini. Unknown.

quadrans, Australia, Berkeley. No type exists. From the description it seems to be xanthopus.

rubripes, Europe, Rostkovius. Known only from an old picture which is probably inaccurate.

rubro-maculatus, Europe, Britzelmayr. Cartoon.

saccatus, Rawak, Persoon=xanthopus.

similis, Brazil, Berkeley. Type very scanty but probably=Polyporus Tricholoma.

squamoso-maculatus, India, Saccardo. Change of maculatus of Berkeley because Peck, twenty years later, published another under the same name. Berkeley's name does not seem to have needed changing very badly on this account.

stipitarius, Cuba, Berkeley=Polyporus Tricholoma.

substriatus, Europe, Rostkovius. Only known from an old illustration which appears to me to be the same as lepideus.

tubarius, Europe, Quélet. Unknown except from his figure, which seems too close to vernalis.

umbilicatus, Java, Junghuhn=arcularius, teste Fries. Bresadola claims it is different from arcularius, but by such slight structural differences that I can not grasp them. The types at Leiden I should refer to arcularius.

Vossii, Europe, Kalchbrenner=brumalis, teste Bresadola.

Weddelii, Brazil, Montagne. No type exists.

Zenkeri, Africa, Hennings. No specimens found at Berlin. Seems from description to be pale xanthopus.

Zollingeri, Java, Saccardo. Unknown and unknowable from such descriptions.

SECTION MELANOPUS.

Plants that have black stems are called Melanopus, but we include in this section only those with pilei that would be classed as Lentus. The soft, fleshy species are included in Ovinus, Sections 43 and 44. Others with black stems will be found in Section Petaloides, Section 23, and in Microporus, Section 45d.

49. STIPE PLEUROPODAL OR CENTRAL, RARELY LATERAL. PORES MINUTE.

VARIUS.—Pores very minute, white. Pileus dark bay to almost black, smooth. Flesh firm. Type form is common in Europe and it occurs under varying forms in many countries. The following eight could easily be considered as forms.

ALBICEPS.—Pileus white, smooth, with firm, compact, white flesh. Pores very minute, white, decurrent. Stem mesopodal, white, rarely slightly black at the very base. The stem is not always black at the base hence the plant may not be sought for in this section. Its firm flesh, small pores, and other characters bring it very close to Polyporus varius even if occasional specimens were not found showing a "black stem." The plant is rare in the United States.

ELEGANS.—This has all the characters of varius except the small size which is so constant that on this one character it is generally held to be a good species.

PICIPES.—Name applied to the black form of varius with more velvety stems. Frequent in England. In the United States this name is applied to a thin dark form of varius.

LEPRODES.—A deformed, irregular, submerismatoid form of varius. Rare in Europe and the United States. Given in Fries as a variety of Polyporus melanopus.

ADMIRABILIS.—A large, *white,* thick plant with a rudimentary stem. Very different from varius in some features but very close in the essentials. Rare, and occurs in the extreme eastern part of the United States.

BLANCHETIANUS.—For me this is a tropical, reduced form of varius. Short stem, small size, but in all essential characters it is the same as varius.

DICTYOPUS.—For me the tropical form of picipes-varius. Color *black* and it is smaller than the form of temperate regions. Usually known as infernalis of Berkeley which is the same thing. Widespread in tropical countries, Brazil, Africa, Ceylon.

PAUCHERI (Fig. 482).—A form of the preceding with striate pileus. Common in Australia and at Kew it is referred to infernalis.

MELANOPUS.—Pileus villose or rarely scaly. Growing in the ground attached to buried sticks by which habits it can be told from varius which usually grows on trunks or decayed spots of living trees. Rather rare in both Europe and the United States.

SECTION MELANOPUS.

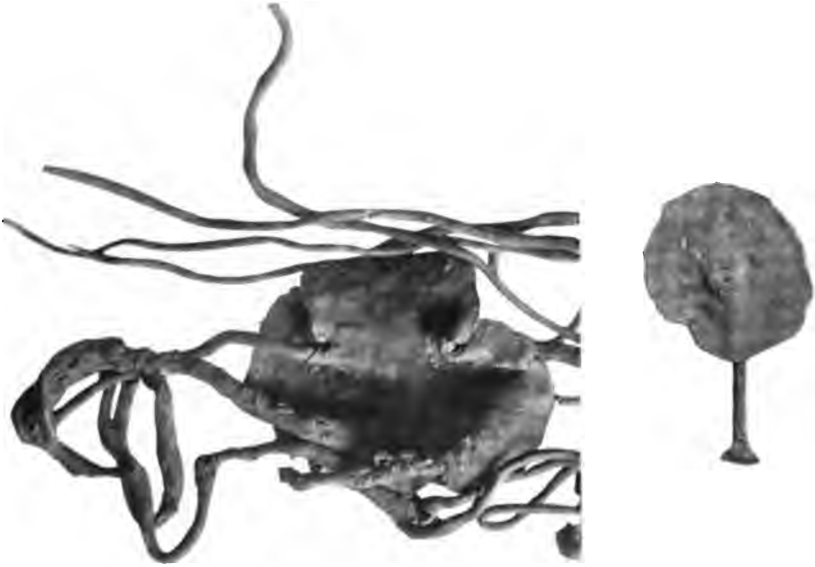

Fig. 479

Melanopus Rhizomorphus.

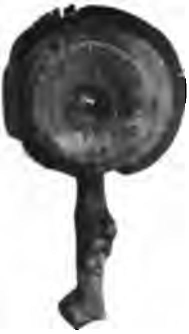

Fig. 480

Melanopus veluticeps.

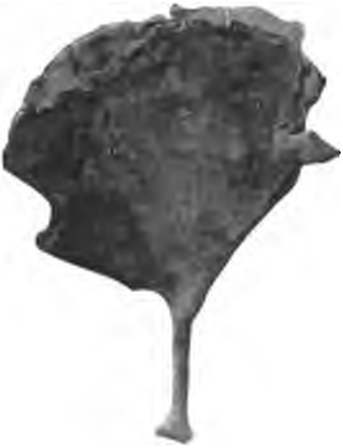

Fig. 481

Melanopus Lepreurii

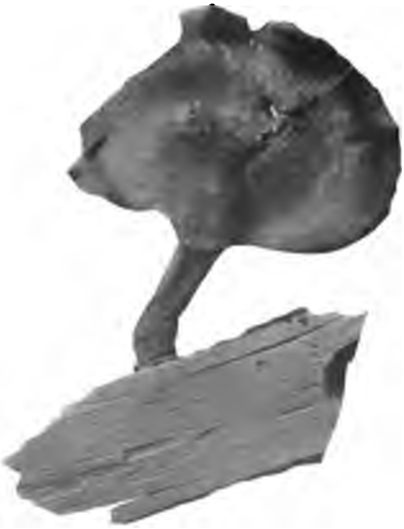

Fig. 482

Melanopus Paucheri.

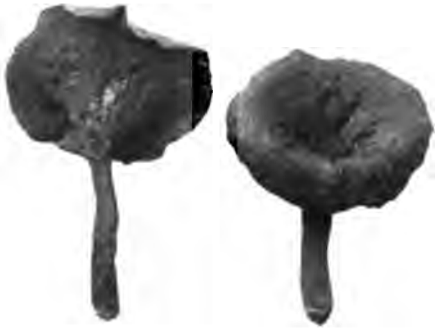

Fig. 483

Melanopus rubrocastaneus.

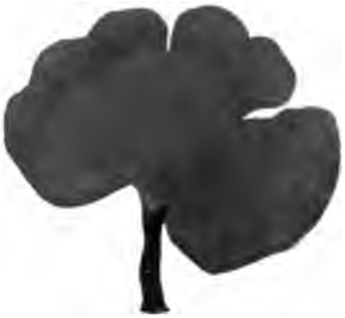

Fig. 484

Melanopus hemicapnodes.

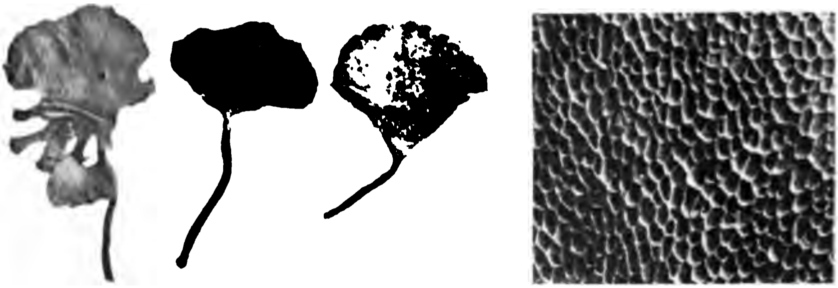

Fig. 485

Melanopus Guyanensis (with pores enlarged X6).

RHIZOMORPHUS (Fig. 479).—Produced by long, black, woody rhizomes which I judge are aerial. Known from abundant material in Montagne's herbarium from tropical America.

VERNICOSUS.—Mesopodal, black. Quite peculiar structure, having the dark hyphae prolonged into protruding pointed setae in the pores. Known from a single specimen at Kew from Brazil.

VELUTICEPS (Fig. 480).—Quite different from all others of this section, the pileus having the general appearance and color of Polystictus perennis. Stem black, spores doubtless white. Not related to perennis however. Known from one collection from Africa at Kew.

HEMICAPNODES (Fig. 484).—Slender, smooth, sometimes infundibuliform at first. The slender, black stipe is sometimes mesopodal and lateral in the same collection. Originally from Ceylon, common in Samoa and seems to occur in the East generally.

LEPRIEURII (Fig. 481).—Entire plant including the minute pores is dark, fuliginous. Stipe mesopodal or in most of the specimens lateral. Known from very abundant collections sent Montagne from French Guiana.

HYDNICEPS.—Stipe short, rudimentary but black. The "hydnoid" processes of the pileus from which the plant was named are much exaggerated. Known from three apparently undeveloped specimens at Kew, from Cuba. I should not be surprised if it develops into the section Merisma when it is well known.

RUBRO-CASTANEUS (Fig. 483).—Stem short, black, mesopodal. Pileus infundibuliform, reddish brown, smooth. Pores small, decurrent. Hyphae pale colored. Spores not found. This is the only truly infundibuliform species with black stem. The pileus is the same peculiar reddish color as Polyporus virgatus. Specimens from Malacca (Malay) at Kew.

50. STIPE PLEUROPODAL OR CENTRAL. PORES MEDIUM.

GUYANENSIS (Fig. 485).—Slender with a dark, slender stipe. Pores white, medium, favoloid in shape. Seems to be frequent in tropical America.

PODLACHICUS.—Unknown to me, but described as similar to elegans but *larger pores*. Rare in Europe, no doubt.

51. STIPE PLEUROPODAL OR CENTRAL. PORES LARGE, FAVOLOID.

(Probably all better classed in the genus Favolus.)

PUTTEMANSII (Fig. 486).—Pileus white, with dull, smooth surface. Pores large, favoloid, white. Stipe all black. Known from a half specimen at Berlin from Brazil. I have also a specimen from Rev. Rick.

WRIGHTII (Fig. 487).—Pileus white with striate surface. Pores large, white. Stipe mesopodal, black, abruptly enlarged at the base. Type from Cuba (Wright 201) but not found at Kew nor cited by Berkeley. Known to me from a specimen from Rev. Rick, Brazil, which seems to accord with the description, but of course I can not say that it is correct.

VADOSUS.—Pileus rigid, pale, with smooth or slightly virgate pileus. Stipe mesopodal, black, with a rooting base. Pores large, favoloid, shallow. Based on a specimen at Berlin, collected in Guadelupe by Duss and determined, evidently in error, as "Favolus dermoporus, Pers." This may be the same as marasmioides, which is unknown to me.

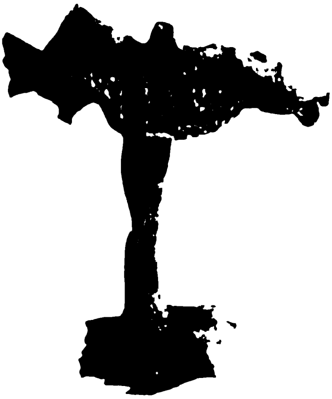

Fig. 486
Melanopus Puttemansii.

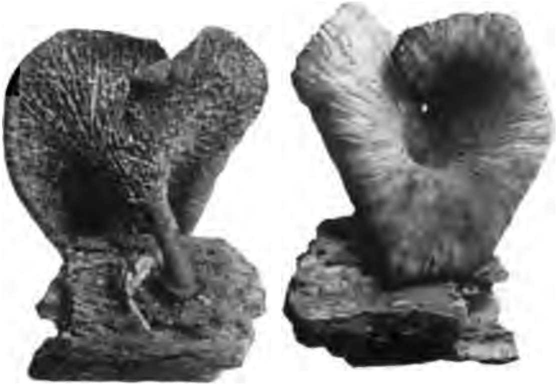

Fig. 487
Melanopus Wrightii.

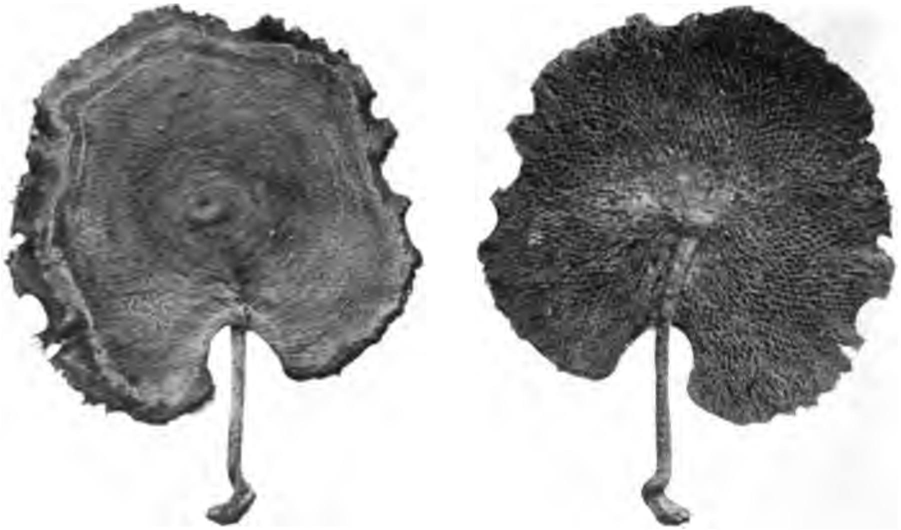

Fig. 488
Melanopus palpebralis.

PALPEBRALIS (Fig. 488).—Pileus dark, thin, with a minutely tomentose surface. Margin ciliate with short hairs. Pores dark, favoloid. Stipe mesopodal, slender, black. Based on a specimen at Paris from French Guiana, labeled by Montagne "ciliaris vel affinis." It is close to ciliaris but differs in its dark color and *black* stipe.

MARASMIOIDES.—Not seen by me, but it seems peculiar in its slender form and habitat (seed of Melioma). Perhaps it is the same as vadosus.

52. STIPE LATERAL, BUT THE PILEUS IS NOT SPATHULATE. PORES MINUTE.

LATERATUS.—Pileus reniform, white, firm. Pores minute, now dark. Stipe lateral, black. Named by Persoon from a specimen from Rawak now preserved in good condition at Paris. Referred by Fries, who never saw it, to Polyporus affinis, to which it has no affinity, and compiled in error in Saccardo as a synonym. In my opinion it is a *lateral* stemmed form of elegans of Europe.

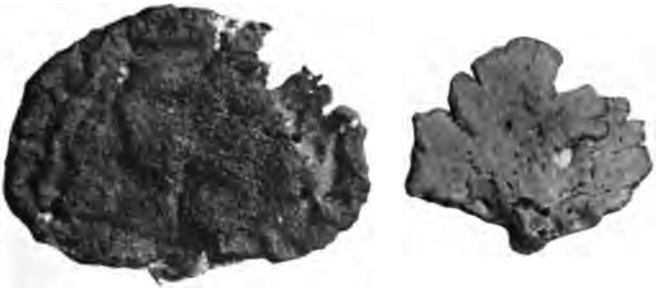

Fig. 489

Melanopus nephridius.

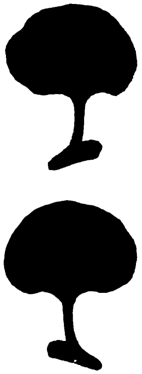

Fig. 490

Polyporus melanopus (bis).

NEPHRIDIUS (Fig. 489).—Pileus bay brown, with a slightly scabrous surface. Stipe lateral, short, black. Pores white, minute. Known from a few collections from South America. It is a plant intermediate between this section and the section Microporus, but is closer to this.

GAYANUS.—Pileus rigid, firm, smooth. Context pale. Stipe black, lateral, rudimentary. Known from one collection made in Chile by Gay, which has another name, cycliscus.

(Dictyopus and hemicapnodes in the preceding sections sometimes have lateral stipes.)

53. STIPE LATERAL BUT PILEUS NOT SPATHULATE. PORES MEDIUM OR LARGE.

PUSILLUS (bis or tris).—A minute, little plant, known from *one single specimen*, less than 1 cm. in diameter, at Upsala, collected in Brazil, eighty years ago. Stipe lateral, short, round, black. Pores favoloid. Referred by Fries to his then new genus, Favolus, but is quite distinct from the type of plants that have since become known under that name.

MELANOPUS (bis) (Fig. 490).—Pileus reniform, smooth. Pores medium favoloid. Stipe lateral, smooth, black. Known from two little specimens in Montagne's herbarium from South America. Classed by Montagne in Favolus but its relations are entirely with this section.

54. (PETALOIDES) STIPE LATERAL. PILEUS SPATHULATE, TAPERING TO THE STIPE.

These plants could be put in a section Melanopus of Section Petaloides with equal propriety.

GUILFOYLEI (Fig. 491).—Pileus thick, rigid, smooth, pale or yellowish. Pores very minute. Pileus tapering to a short, black stipe. Originally from Australia. Specimens at Kew from Australia, Samoa, Philippines, Malay, and Mexico.

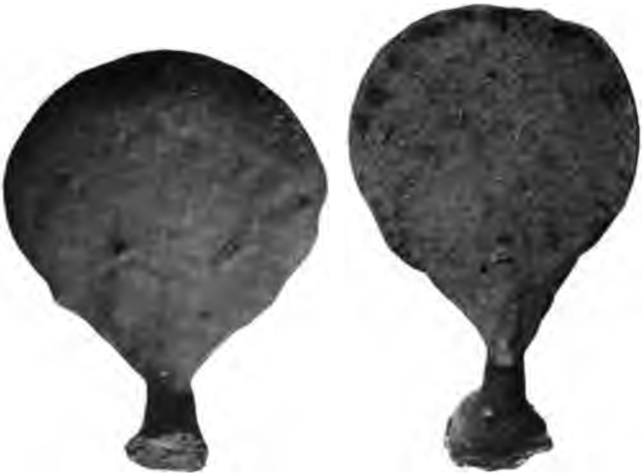

Fig 491

Melanopus Guilfoylei.

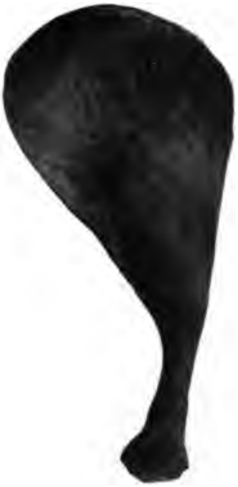

Fig. 492

Melanopus Warburgianus.

WARBURGIANUS (Fig. 492).—Pileus thick, rigid, smooth, *dark*. Pores minute, *dark*. Stipe short, black but there is no distinct ring at the base as shown in Hennings' figure. Known from a single specimen at Berlin from the Celebes. Classed by Hennings and found in Saccardo as Fomes (sic). Murrill's Philippine references are all wrong.

XEROPHYLLUS (Fig. 493).—Pileus subreniform, but tapering to the short, black stipe. Surface strongly raised, striate. Pores minute. Known from a single specimen at Kew from New Zealand.

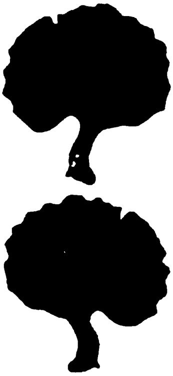

Fig 493

Melanopus xerophyllus.

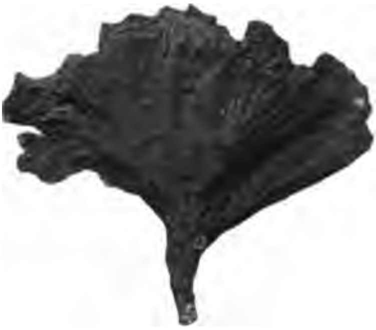

Fig 494

Melanopus radiato-scruposus.

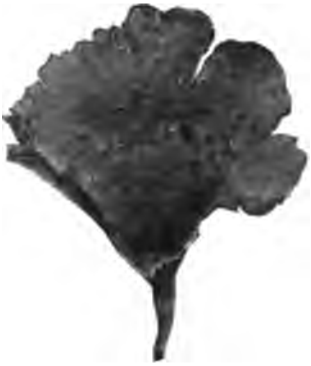

Fig 495

Melanopus malnominus.

RADIATO-SCRUPOSUS (Fig. 494).—Pileus spathulate, dark brown, strongly rugulose, striate, tapering to a short, lateral black stipe. Pores small. Known only from the type specimens at Berlin from Brazil.

MALNOMINUS (Fig. 495).—Pileus spathulate, reddish brown, smooth, with crenate, lobed, thin margin, tapering to short, smooth, lateral, black stipe. Pores minute, probably white when fresh. Specimens at Paris from Mexico which had been sent to Cooke and named "Teysmanni, Berk." which does not exist, and the name is not appropriate for a Mexican plant.

SYNONYMS, REJECTED AND UNKNOWN SPECIES.

atratus, Mexico, Fries. No type exists.

atripes, Asia, Rostrup. Unknown.

atrofuscus, South America, Léveillé. Type inadequate. Probably only a short stemmed specimen of lateralis.

Beccarianus, Borneo, Cesati. Unknown.

Calyculus, South America, Patouillard. Unknown to me, but from the figure I judge it is hemicapnodes.

cyathoides, Europe, Swartz. Unknown in the museums and referred to a small form of melanopus.

cycliscus, South America, Montagne=Gayanus and based on the same collection.

diabolicus (bis), Brazil, Spegazzini. Unknown.

dimorphus, Malay, Cooke=hemicapnodes with a lateral stipe.

fissus, United States, Berkeley. Type inadequate. Probably depauperate picipes and not fissile.

glabratus, Australia, Kalchbrenner. Unknown.

infernalis, Brazil, Berkeley=dictyopus, but most of the specimens in the museums bear this name.

Juranensis, Brazil, Hennings (as var. of Leprieurii)=Guyanensis.

maculosus, Central America, Murrill. Unknown.

minimus, Europe, Fries. A tiny, little form of elegans. No specimens known.

nephelodes, South America, Léveillé. No type exists. Said by Fries to be the same as infernalis.

nigripes, Africa, Massee=hemicapnodes.

nummularius, Europe, Bulliard=elegans.

pertenuis, Asia, Kalchbrenner. Unknown.

pusillus, Asia, Rostrup. Unknown to me. Said to be zoned, hence probably does not belong in this section.

rufo-atratus, Brazil, Berkeley=rhizomorphus (sans rhizomes).

scabellus, West Indies, Patouillard=nephridius.

seminigrita, Brazil, Berkeley=Guyanensis.

Strangerii, Australia, Mueller. Unknown. Seems from the description to be dictyopus.

subelegans, West Indies, Murrill. Unknown to me. The description suggests xerophyllus or radiato-scruposus.

tephromelas, South America, Montagne=Leprieurii.

Teysmanni, Mexico, Cooke. (Mss.) Changed to malnominus.

trachypus, United States, Montagne. Based on an abortive picipes.

tubaeformis, Europe, Karsten. Evidently close to varius and given as a form in Saccardo.

Underwoodii, United States, Murrill. I think will prove to be the same as admirabilis.

versiformis, India, Berkeley. Based on two little specimens, one of which seems to be melanopus, the other I think is different.

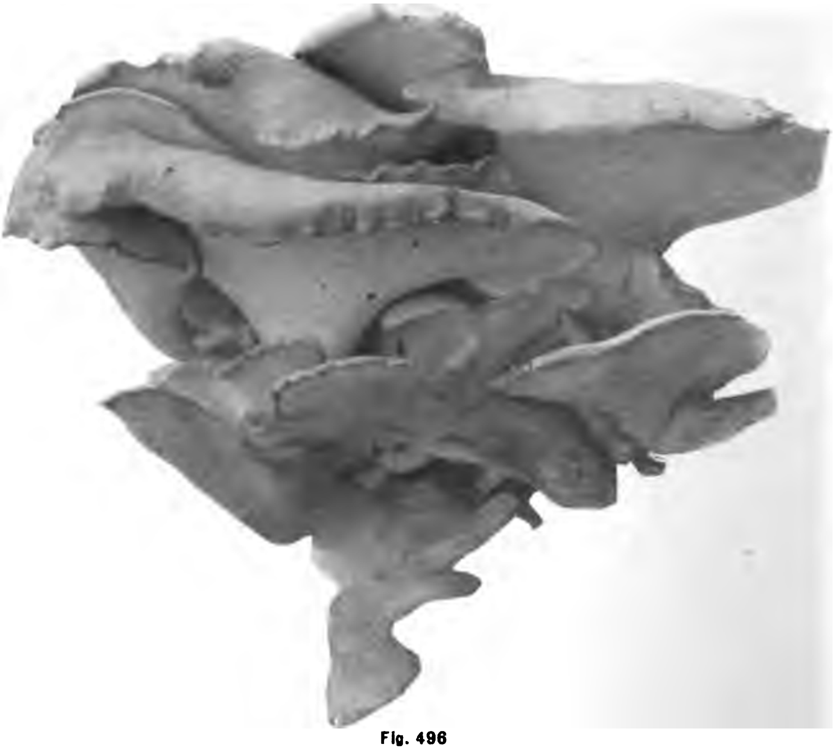

Fig. 496

Petaloides osseus.

ADDENDA.

NOTES. COMMENTS AND OMISSIONS.

The following points have come up since this pamphlet has been in type. We include here some comments on Romell's article on Brazilian fungi, a critical and valuable paper which we did not have at Kew, when the main portion of this pamphlet was written.

MESOPODIAL AND PLEUROPODIAL.

These terms which are really coined words, meaning central and excentric stemmed, are for the most part spelled Mesopodal and Pleuropodal in the body of the work. The correct spelling is probably Mesopodial and Pleuropodial to correspond with the word podial as spelled in the Century Dictionary.

SECTION GANODERMUS 2.

LUCIDUS.—Several collections received from C. D. Mahaluxmirala shows that this is one of the most puzzling and variable species in the tropics. The tropical form so referred are not as strongly laccate as the European form. The stem is usually shorter, thicker, and often mesopodial. It is usually pleuporodial in temperate regions. It varies in the tropics also greatly as to the color. Numerous intermediate species connect it with Curtisii.

SECTION AMAURODERMUS 5.

AURISCALPIUM.—A fine collection has recently been received from Gustav Peckolt, Brazil. It is evidently quite a common plant in Brazil. The stipe proceeds from a deep rooting rhizome and probably connected with a creeping rhizome, though none of these specimens show it.

Most of the specimens are "auriscalpium" in shape, though some are mesopodial. I expect in time that Auriscalpium, omphalodes, praetervisus, boleticeps, and rufobadius will all prove to be one and the same species.

SECTION AMAURODERMUS 5.

CHAPERI (Page 112, fig. 406).—We have recently received a specimen from Gustav Peckolt, Brazil, which is the second specimen known. The original in the museum at Paris was supposed to come from Cuba.

It has a character that I have noted in but very few species (Polyporus vernicosus p. 182, and Fomes pachyphloeus Myc. Notes Pol. Issue, p. 34). The ligneous, colored, hyphae fibrils of the pore walls are pointed on the ends and project into the pores simulating the colored setae of many species, which are called cystidia, and which are distinct from the subhymenial tissue.

SECTION AMAURODERMUS 5.

RUDIS.—Specimens received from Australia are much larger than any in the museums of Europe. One specimen had a pileus eight inches in diameter.

SECTION AMAURODERMUS 5.

VARIABILIS (cfr. p. 111).—I think this is only known from the original collections of Spruce (No. 57 and 183 part) and Berkeley confused under this name two quite different species. Romell refers here and figures a plant from Brazil that must be different, first in its dark color (atrocastaneus). Variabilis is pale-colored. Second, in its much more obese habits (cfr. Romell's figure, Tab. 2, f. 31, with our figure 405 of the type). Third, in the spores described as "granulis," and they are smooth as far as I can note in the type.

SECTION LIGNOSUS 10.

DEALBATUS.—Few plants have been worse confused than dealbatus. It was originally collected by Ravenel and Curtis and named by Berkeley in 1853. These types are all I have seen. (There are cotypes also in Ravennel's collection in British Museum). They are found in a "Fomes" cover at Kew, but should be classed as a Polyporus.

At the same time Berkeley named mutabilis also from Ravenel's collection. It has little resemblance to dealbatus (cfr. figs. 422 and 446), and is a thin, zonate plant, a Polystictus as classed. Ravenel distributed (Fasc. 3, No. 10), Polystictus mutabilis as dealbatus, and Berkeley, when he made his resume in Grevillea, cites this distribution as being correct. Berkeley made so many "new species" he could not remember them himself.

Dealbatus is found in Saccardo, vol. 6, p. 159, as a "Fomes," and also page 218 as a "Polystictus," both with exactly the same description, word for word, and "Polystictus" has as much resemblance to "Fomes" as a piece of paper has to a lump of coal. It is a good example of the value of our "literature."

Murrill, in his half-hour studies in the principal museums, probably never saw the type specimen, for he gives mutabilis as a synonym for dealbatus. He uses the word dealbatus in keeping with the sacred principle of priority, it having been published in a "prior" position (the previous page) in the same article. Of course, that is much more important for the purpose of a juggle than the fact that the plants have little resemblance or relation to each other, and should not be classified in the same section. Then to make the matter more binding he discovers that mutabilis and unguicularius (which no one knows anything about) and a few others form a "new genus" and takes Polyporus dealbatus as his "type species."

SECTION LIGNOSUS 10.

PAULENSIS.—In a letter just received from Bresadola, he writes me that paulensis is a young specimen of angustus. I should never suspect it and the spores, according to my observations, were not the same.

SECTION LIGNOSUS 11 C.

Context colored. Setae present.

(See Musashiensis, page 135, Fig. 436. Also remarks on page 191).

SECTION LIGNOSUS 11B.

SCOPULOSUS.—This is a marked species with its black stem and smooth pale pileus crust. It was named by Berkeley from Australia fifty years ago, and the type is in good condition although "effete." Then Reichardt published a good figure of it under the name Trametes Rhizophorae. It grows in Australia and in the East abundantly, and has been known to European mycologists from abundant collections for years. It was sent to Murrill from the Philippines in quantities, and he referred it to a "new genus" that he had discovered under the specific name anebus, to which species it has no resemblance whatever. On his second visit to Kew he probably noted that the specimens that Cooke had referred to "anebus" were badly named and he "corrected" it, this time discovering it was another "new genus" and referred it to "Warburgianus," to which species it has less resemblance than to "anebus." It is curious how much easier it is to discover a "new genus" than it is to learn an old, common and well-known species, which is abundantly represented in the museums. We have specimens from A. D. Machardo, Perak; S. Hutchings, Bengal; and Bresadola, Philippines.

When in its prime the surface is smooth, but weathered specimens become scrobiculate. Such a specimen was the "type," and was named evidently from this "character." This is one of the misfortunes that plants often suffer from being named by those who have very scanty knowledge of them.

SECTION PETALOIDES 12.

OSSEUS (Fig. 496, page 188).—We have not included Polyporus osseus among the stipitate species, although as the pilei taper to short stem-like bases, it might be sought in this section. Its general habits of growth are imbricate, like many sessile species belonging to the section Apus of Fries. We know of no other species similar in this respect. Polyporus osseus is a rather rare plant in Europe as it is in the United States. The flesh when growing is firm and in drying becomes quite hard, hence it is not badly named. The European plant is white as far as I have seen specimens, but the American plant is gray. I have known it in America for years without a name for it, for I did not associate it with the white European species. However, Bresadola so refers my American specimens, and I believe correctly. (See Figure 496, page 188).

SECTION PETALOIDES 13.

FRACTIPES.—This has a *lateral stem* and is a *white* plant. The "type" specimen of fractipes may have had its stem broken, but the name has no application to the plant usually, and it seems a pity to have a plant so misnamed on account of an accidental feature of the type. It grows more common in the South, but has been found by Peck and called Polyporus humilis. It also reaches me from Rev. Rick, Brazil.

Polyporus Peckianus is a *yellow* plant with a *central* stem. It is very rare and I have but two collections (D. B. Griffin, Vermont, and A. S. Bertolet, Canada). It is given as a synonym for fractipes by Murrill, but differs entirely. He calls the plant "fractipes Berk." and draws the description from Peck's specimen. He puts it in the section Merismus, and neither fractipes nor Peckianus belongs there. One belonging to the section Petaloides with lateral stem, the other to Lentus with a central stem.

SECTION PETALOIDES 15.

MODESTUS AND RUBIDUS. The former is frequent in South America, the latter in the East, and I have been very much puzzled to decide if they are the same or different species. Both, I think, are rose-colored when fresh, but the old specimens I have seen are more brown, having lost the fresh color. Romell records both from Brazil (with different spores), but as he compares the color of rubidus with vinosus I judge the determination is doubtful. At Leiden I have seen old specimens determined as rubidus which are dimidiate and imbricate, but I do not know if correct or not.

Modestus is confused in the Kunze exsiccatae, the specimen at Kew not being the same as the type at Upsala. Berkeley at first had it right, but afterwards misled by the Kunze misdetermination he referred it usually to albo-cervinus, which is a synonym for modestus.

SECTION PETALOIDES 17.

MUSASHIENSIS (page 135, fig. 436).—This, I think would have been better placed in a section of Lignosus than Petaloides. It should go in Section 11c, being the only species in the section with setae. In its structure it is allied to gilvus, etc. My reference of Mr. Kawamura's specimen to Henning's species, on the description only is of course doubtful. The specimen was submitted to Bresadola and was unknown to him, and he probably is acquainted with Musashiensis.

SECTION PETALOIDES 18A.

PERVERSUS.—We have so indicated a form of Polyporus grammocephalus, which was collected by Copeland (No. 18) in the Philippines and recorded and distributed to three museums in Europe as being coracinus, as named by Mr. Murrill. This collection was probably so named by Mr. Murrill, but is quite different in its structure in having no cystidia whatever. The original coracinus has very peculiar cystidia, I am told by Bresadola, and is the same or close to cinnamomeo-squamosus as illustrated, Fig. 441. I have not seen the original of coracinus, and until I learned of the mistake I took these Copeland specimens in good faith.

SECTION PETALOIDES 18 C.

It develops that there are several polyporoids with very peculiar setae, as illustrated in Figures 441 and 442. The species considered in this pamphlet are cinnamomea-squamosus (p. 138) russiceps (p. 138), megaloporus (p. 138), and coracinus (p. 146, unknown to me). In addition, Favolus princeps of Cuba has these same peculiar cystidia and perhaps other species of Favolus. Bresadola is inclined to refer them all to one species. They seem different to me in macroscopic characters, though the microscopic characters are quite close.

SECTION MERISMUS 28.

DISPANSUS (Fig. 498). Pileus submerismatoid, appearing to be borne irregular from a common base. Surface smooth. Color yellowish. Pores small, colored, reddish brown (about same color as those of Polyporus rutilans). Context thin, the pores almost reaching the cuticle. Spores abundant, globose, smooth, 3½-4 mic., hyaline.

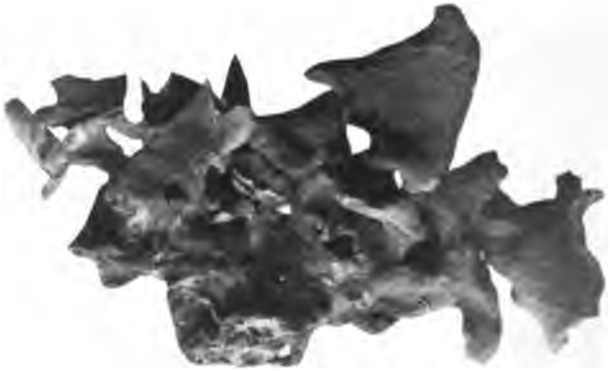

Fig. 498.

Merismus dispansus.

Type from A. Yasuda (No. 7) from Sendai, Japan.

This is quite similar in its habits to Polyporus Wynnei of Europe, which is the only plant to my knowledge that it suggests. Both are doubtfully included in the section Merismus. The Japanese plant is abundantly different from the European in its colored pores, and spore shape. We have no plant in the United States that approaches either.

SECTION MERISMUS 29.

FIMBRIATUS.—The common plant in the American tropics which has the peculiar hymenial configuration, as shown in Figure 453, has been classed in six different genera. We consider it as a degenerate type of a polyporoid. We refer it to fimbriatus following Bresadola, though the type specimen of fimbriatus at Upsala has perfect pores. Otherwise it seems to be the same to us.

ORIENTALIS (Fig. 499).—Entire plant concolorous, ferruginus brown, turbinate, tapering to a short thick stipitate base. Surface smooth, faintly zoned, minutely velutinate, soft to the touch. Context ferrugineus. Hyphae colored. Pores minute. Setae colored, pointed, straight, thickened at the base. Spores 4 x 5, pale colored or sub hyaline.

Type from Jintaro Umemuro (No. 1) Akazaki, Japan.

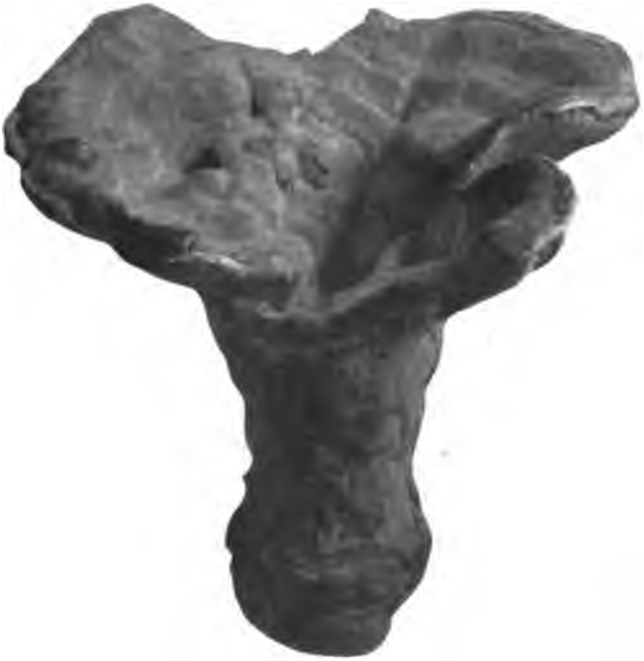

Fig. 499.

Pelloporus orientalis.

This species is allied to Polyporous tomentosus, but differs in its form, setae, and surface, and has no spongy upper layer. The spores we have not found in numbers so that we are very sure about them, and possibly they are hyaline. In that case the plant in its context color, setae and spores is close to Polyporus musashiensis (page 135). While the plant is evidently more closely related to Polyporus tomentosus than to any in the section Pelloporus, we feel it can not be placed with tomentosus in the section Spongiosus.

SECTION PELLOPORUS 36A.

(Related to Amaurodermus).

TURBOFORMIS (Fig. 500).—Pileus depressed on top, turbinate, tapering to a short, thick stem at the base. Surface rugulose, reddish brown. Context light gilvous yellow, sublignous. Hyphea deep yellow. Pores brown, darker than the context, minute, with glancing mouths. Setae none. Spores globose, non-apiculate, deep colored, smooth, 5-6 mic. in diameter.

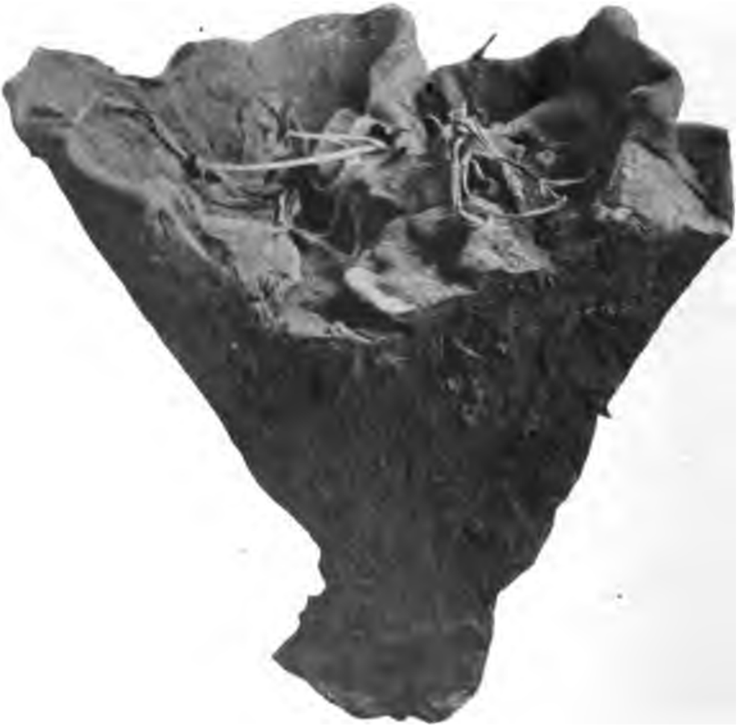

Fig. 500

Pelloporus turboformis.

Type from G. H. Krumbiegel, Baroda, India.

This species is quite different from anything that I have found named in the museums. It resembles a Ganodermus in its general effect, but is quite different in its context color and spores I am at a loss where to place it for it really should form a section of lignose plants close to Amaurodermus. However, I do not like to multiply the sections. It has a distant relationship to Polyporus vallatus, hence I place it (provisionally) in a related section, but according to our key characters it would be sought in Amaurodermus.

SECTION PELLOPORUS 36.

We have a collection from Prof. A. Yasuda (No. 12), Sendai, Japan, which is unknown to us and we believe unnamed. It seems to have an abortive and probably fictitious stipe. The color context and pores is ferrugineus. Setae none. Spores globose 4-5 white (or perhaps very pale color). We would prefer not to name it until we learn more as to its normal stipe characters.

SECTION PELLOPORUS 37C.

Context thin. Hymenium with Setae.

HAMATUS.—Mesopode, subcoriaceus, infundibuliform. Context thin (not spongy). Setae slender curved. Spores colored, elliptical, smooth, 5-6 x 8-9.

I know this only from Romell's excellent description and figure based on material from Brazil. It differs from all others of the section Pelloporus in having setae. In the nature of the setae (curved) it is close to Polyporus circinatus (p. 159) in the section Spongiosus.

SECTION OVINUS 39.

We have an unnamed specimen from Prof. Petch, Ceylon, that we would refer to this section, although it is thinner and not so fleshy as others in this section. It might be included in Lentus, although as it grows in the ground in its habits it is more allied to Ovinus. Prof. Petch tells me it is quite rare in Ceylon and grows in circles.

SECTION MELANOPORUS 44.

HARTMANNI.—The only collections are two at Kew and one recently received by me from Miss Margaret Flockton, Australia. The spores are 5 x 12, hyaline, smooth. The species is badly figured in the Handbook, as it is evidently not red as shown, but brown.

SECTION LENTUS 45 (d MICROPORUS).

INCOMPTUS.—This was given in my Synopsis as a synonym for flabelliformis, my view being based on a specimen named by Fries, which has a lateral stipe. In the sense of the figure given in Reliquiae Afzelianae it has a mesopodial stipe and is the same (and for me the correct name now) as what was called in my pamphlet Polystictus Holstii. Fries evidently did not attach any value to the mesopodial and pleuropodial characters in this section.

SECTION LENTUS 46A.

PARTITUS (cfr. p. 175).—Romell records and figures this plant from Brazil. He records the spores as elliptical, "hyaline-luteolae" 7 x 11-12.

SECTION MELANOPORUS 54.

GUILFOYLEI AND WARBURGIANUS.—These two species are not as close as might be inferred from our figures. Guilfoylei is a pale colored plant and Warburgianus is almost black. Murrill refers Guilfoylei as a synonym for elegans, which is almost as bad a reference as his determination of scopulosus, first as anebus, then as Warburgianus. The five species Guilfoylei and elegans, anebus scopulosus and Warburgianus, which he has muddled have no resemblance and little relation one to the other.

INDEX SYNONYMS, MISTAKES, ETC.

Species which in my opinion, are synonyms, errors, mistakes or blunders, species that rest on some old vague description of which no material exists, also the species that have not been seen by me and of which no specimens have been found in the principal museums, together with the country from which they have been exploited, and the names of those who are responsible for this work.

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